

# CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society  
Of America

Vol. XXVII NOV.-DEC., 1955 No. 6



FIG. 152. The chuckwalla feeds on the flowers of  
*Mammillaria tetrandra* in Proctor's collection.  
See pg. 176



## CACTUS AND SUCCULENT JOURNAL

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## CONTENTS

From the President's Desk.....	Homer G. Rush	162
Some New Varieties and Nomenclatural Changes in <i>Ferocactus</i> .....	George Lindsay	163
Four Hundred Cacti in One Soil.....	R. C. Proctor	176
<i>Echeveria flammea</i> Hort. ? .....	Don B. Skinner	179
Studies of South American Cactaceae, 5 <i>Neoporteria taltalensis</i> .....	Paul C. Hutchison	181
Cacti in New York City.....	Richard L. Russell	184
A New Species of <i>Mammillaria</i> .....	Howard E. Gates	185
Questions and Answers.....	Harry Johnson	187
An Interesting <i>Monanthus</i> .....	J. R. Brown	188
Notes on <i>Haworthias</i> , <i>Haworthia planifolia</i> var. <i>poellnitziana</i> .....	J. R. Brown	189
Spine Chats .....	Ladislav Cutak	191

## FROM THE PRESIDENT'S DESK

As the second of my two terms as President of the Cactus & Succulent Society of America Inc. draws to a close I wish to sincerely express my thanks and appreciation to the Officers, the Executive Board Members and all the members of the Society for their very loyal support, their very sincere help and for the fine way they have accepted and carried through the many plans which were started for the benefit of the Society and its members.

During the last two years the Society has held its Sixth Bi-ennial Convention in El Paso, a very successful affair and one that I feel was thoroughly enjoyed by all who attended. Also several public meetings were held for those local enthusiasts who could attend. Also during this time new books were added to the Society Library and many books were made available to the members in the United States on a plan for loan of the books at a minimum of cost to the member. More books will be added to the loan list as soon as they are available.

Due to the efforts of the Secretary, many new members were acquired for the Society and renewals were secured from many who had dropped out.

Dr. Lyman Benson, Vice-President during these two years, was invaluable by helping me and taking charge of our public meetings and making them the fine success that they were.

Many of the other Officers and Executive Board members gave me much assistance at the expense of their own affairs for which I thank them.

I also feel that the support and help that were given to me will continue to be given to the new President during his term or terms as that

is the only way that your Society can successfully function.

So again, as this will be my last message as President, I thank each and every one of you for your help and sincerely wish all the success in the world to the new President and the Officers, Executive Board members and the members of the Society.

HOMER G. RUSH

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUESTED BY THE ACT OF CONGRESS OF AUGUST 24, 1912. Of Cactus and Succulent Journal, published bi-monthly at Pasadena, for October, 1950. State of California, County of Los Angeles.

Before me, a notary in and for the State and county aforesaid, personally appeared Scott E. Haselton, who, having been duly sworn according to law, deposes and says that he is the Editor-Publisher of the CACTUS AND SUCCULENT JOURNAL, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Scott E. Haselton, 132 W. Union St., Pasadena, Calif.

2. That the owner is: CACTUS AND SUCCULENT SOCIETY OF AMERICA, INC.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. Cactus and Succulent Society is a nonprofit organization and issues no stock.

NICK NAKAMURA, Notary

/ / /

## INDEX AND BINDING JOURNALS

Our policy has been to bind Journals every other year, which means that we will not be binding this year. The Jan.-Feb. issue of 1956 will contain the index for Vol. XXVII; this should be removed and placed with your No. 6 issue of 1955.

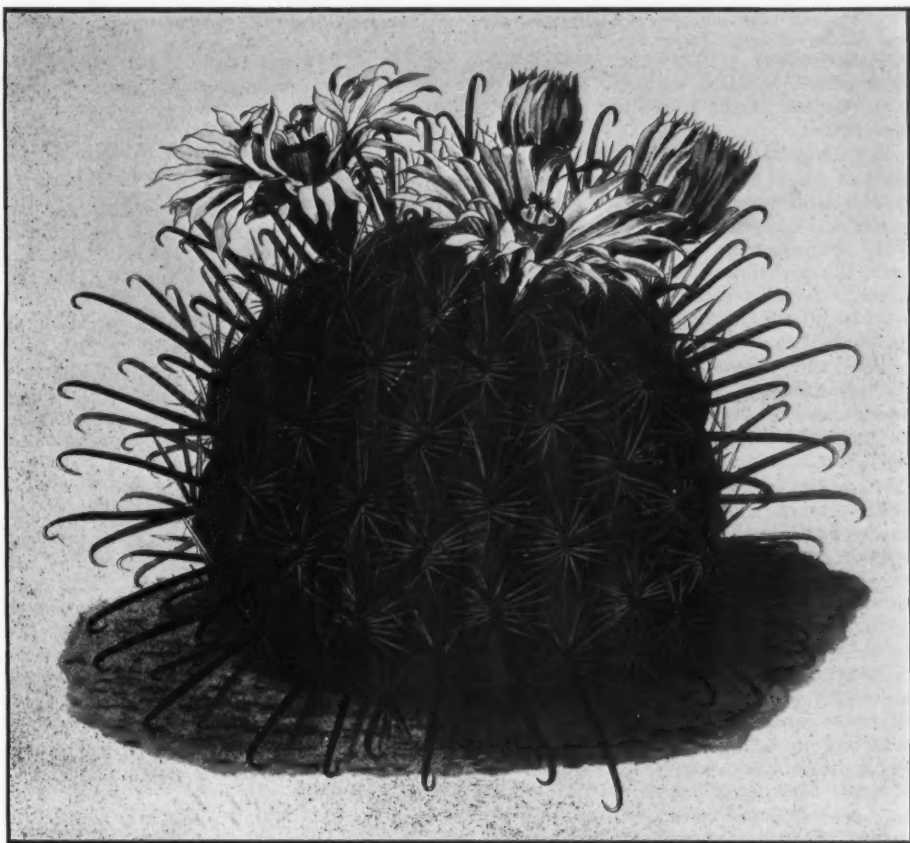


FIG. 153. *Echinocactus fordii* from Blühende Kakteen I, 11, 1903

## Some New Varieties and Nomenclatural Changes in *Ferocactus*

By GEORGE LINDSAY

I have recently undertaken a study of the genus *Ferocactus*, which has involved a review of the literature, examination of available herbarium specimens, and an investigation of the various species in the field. While doing this research I found that certain nomenclatural changes are necessary. Some of these are legalistic and must be made in order for the taxonomic treatment of the genus to conform with the rules of nomenclature. Problems of this kind can be treated objectively because there are written rules which one must follow. It is unfortunate that the application of the

rules sometimes invalidates an old and familiar plant name and substitutes a different strange one. However, the inconvenience of an occasional name change is a sacrifice that must be made if order is to be kept among the more than a quarter million species in the plant kingdom.

There is another type of change which is more difficult to defend. This is the one which switches the rank of a taxon, perhaps reducing one author's species to a variety of another species, or resurrecting a name which some perfectly competent botanist has previously relegated to the synonymy of another. Such changes

are more subjective, and are the personal opinions of the worker. Those divergent personal opinions reflect the different taxonomic philosophies of the botanists involved, and do not mean that one person knows the plants better than another.

The ferocacti are a plastic, polymorphic group of plants which have evolved into about 25 well-defined kinds, or species. The evolutionary development which has already resulted in the 25 distinct species is still going on at all levels. It is probably making the species we now recognize even more distinct from each other. It is also affecting the populations within each species, evolving sub-groups which differ from the other sub-groups.

These different "kinds" within a species may be incipient species themselves, which have not yet become separated by genetic barriers which would prevent their interbreeding with the other members of their complex. They may look and be quite different from the plants in other sub-groups. To one person they might represent separate "species", to another they may appear to be closely enough related to the other variants for all to be considered varieties of the same species, and a third person might decide they were all the same thing.

The taxonomic unit of variety has rarely been used in the genus *Ferocactus*. I think that the distinct variants within a species should be recognized in infraspecific categories, particularly if those variants occupy diverse geographical ranges. The recognition of varieties within a species complex does not deny the close relationships which exist within a plastic group. Rather they recognize that there are incipient species within a complex which have not yet evolved far enough to have obtained genetic independence and species status. A variety is often a geographically isolated or semi-isolated population which has developed morphological uniqueness but is still capable of gene exchange with at least some of the other variants within its species.

It has sometimes been assumed that a variety is an inferior category, somehow less important than the typical variety of the species with which it is associated. This possibly results from the horticultural use of the term "variety", when a minor sport or variation is so named. The fact that a plant is called a variety doesn't imply it is

less important than or in any way inferior to the "type" of the species. The variety is not an appendage to the species. Actually, the fact that one group is a species and another variety of that species is the purely accidental chance that one variant was named first. The variety may represent the whole complex better than the one which happened to be named first.

Present rules of nomenclature attempt to correctly show the true relationships by automatically giving the type species a varietal rank when another variety is included with it. For example, in this treatment I have considered one plant, *Ferocactus coloratus* Gates, to be so closely related to *F. gracilis* Gates that I interpret them to be members of the same species complex. However, they are different, and can be recognized as different. Since *F. gracilis* happened to be described first, I have combined *F. coloratus* with it as a variety, so it becomes *Ferocactus gracilis* var. *coloratus*. The type plant of *F. gracilis* automatically becomes *Ferocactus gracilis* var. *gracilis*. I feel that this treatment properly recognizes that two "kinds" are involved, which are very closely related as evidenced by morphological similarities and the many specimens which are intermediate between the two kinds. If I were to place *F. coloratus* in the synonymy of *F. gracilis* I would be indicating that I felt only one kind is involved, which is not the case. If I were to maintain both *gracilis* and *coloratus* as separate species it would indicate that they were not as closely related as I think them to be.

Another person with a different species concept might combine the two as one species, or on the other hand might maintain them as distinct and separate species, either treatment based on the same data I have used. The fact that I differ from him doesn't mean that I am right and he is wrong. It means that we have different concepts of species and how the natural relationships can best be shown.

In this paper I propose combinations which change the status of some closely related taxa from separate species to varieties of single species. I also describe three new varieties not before recognized, and point out three name changes required by the rules of nomenclature, one of which necessitated a new combination at the genus level.

***Ferocactus fordii* (Orcutt) Britton and Rose var. *grandiflorus* var. nov.**

Ab var. *fordii* floris luteo-rubris demum 6 cm. longis; segmentibus perianthi lineare-lanceoletis 4 cm. longis 4-5 cm. latis differt.

Differs from *Ferocactus fordii* var. *fordii* in habit and flowers: plants to almost 1 m. tall in exceptional specimens; flowers red or orange rather than purple, to 6 cm. long, with linear-

lanceolate inner perianth segments to 4 cm. long and only 4-5 mm. wide.

Holotype: San Bartolome Bay, Baja California, Mexico, *Lindsay* 556, April 28, 1948, de-



FIG. 154

*Ferocactus fordii* (Orcutt) Br. & R. var. *grandiflorus*  
Lindsay, var. nov.

posited at Dudley Herbarium, Stanford University. Isotypes deposited at Instituto de Biología, Mexico, and Natural History Museum, San Diego, California.

Distribution: West coast of Baja California from Cape San Eugenio to below Abrejos Point, and Natividad Island.

The first application of the name *Echinocactus fordii* was made by C. R. Orcutt in 1899, when he followed his original description of *E. chrysacanthus* with the brief note "*E. Fordii* is a name proposed for an allied form with ashy gray spines," and this reference has been accepted as the valid publication of the *E. fordii*. The following year Orcutt gave a fuller description of the new species in his *Review of the Cactaceae* 2: 81. 1900. The plant was named for a San Diego nurseryman, L. M. Ford, who imported a large number of cacti from the west coast of Lower California, and from whom Orcutt probably obtained his specimens. Ford distributed various ferocacti of this relationship under the names *Echinocactus peninsulae*, which is quite a different species, and *E. Santo-Domingo*, a horticultural name which was never validly published. After *E. fordii* was published that name was applied to various plants Ford had supplied, and which were not all the same species. In England F. A. Walton reported in *The Cactus Journal* (British) (2:103) that *E. fordii* "found on one of the small islands in

the Pacific ocean, near the peninsula of California" had flowered in his collection August 1, 1899. Walton's description of the flowers differs from Orcutt's. Karl Schumann illustrated the species with a magnificent colored plate in *Blühende Kakteen*, plate 11, in 1903, but again the plant illustrated varies greatly from the original descriptions (see Fig. 153).

Dr. C. A. Purpus was shipwrecked at Santo Domingo Lagoon, the entrance of which is marked by the mountain called Lagoon Head, in March, 1898, and collected flowers of *Echinocactus fordii* which are now in the University of California herbarium. The original dried specimen which Orcutt used as the type of *E. fordii*, from Lagoon Head, is in the U. S. National Herbarium. The holotype specimen, the Purpus flower specimens, and Orcutt's descriptions all agree, and give a conclusive authentic picture of *E. fordii*.

In 1911 Dr. Rose collected ferocacti at various points along the west coast of Baja California while he was with the "Albatross" expedition. Specimens which he took at San Bartolome Bay flowered in cultivation, and the description of *Ferocactus fordii* in Britton and Rose (1922: 126) is partially based on that material. I have had opportunity to observe and collect the ferocacti which grow in the coastal area of central Baja California, and believe that more than one taxon is represented. The authentic material of *Ferocactus fordii* var. *fordii* is quite different from the San Bartolome material which Britton and Rose included in it. It may be that two species are represented, but similarities in spine formation, and the numerous distinct but only slightly differing populations represented in the complex seem to indicate that the San Bartolome plants, which are also representative of coastal plants to the south, should be considered a variety of *Ferocactus fordii*, which I am describing as *Ferocactus fordii* var. *grandiflorus*.

The new variety has red or orange flowers with linear-lanceolate perianth segments 4 cm. long and 4 mm. wide, while var. *fordii* has purple flowers about half that size, with spatulate or sub-obovate perianth segments only 2 cm. long but up to 8 or 10 mm. wide.

The isolated population on Natividad Island have red or orange flowers and should be referred to variety *grandiflorus*, although the flowers are not as large as those of typical plants from San Bartolome Bay.

*Ferocactus fordii* var. *fordii* occurs in the coastal area of western Baja California from San Quintin to Cape San Eugenio, and is replaced in the south by var. *grandiflorus* from Cape San Eugenio to below Abrejos Point.



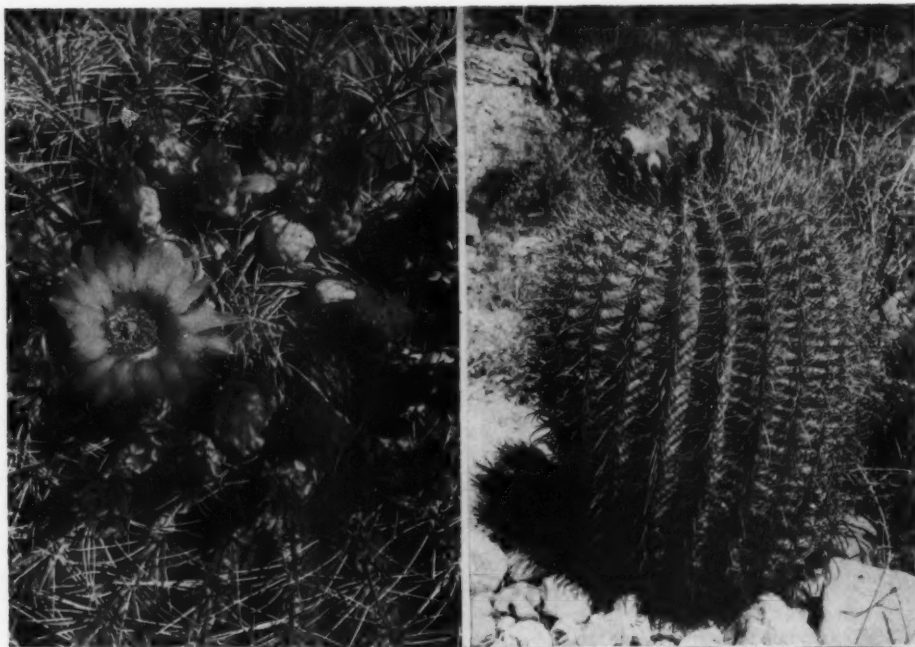


FIG. 155

*Ferocactus wislizenii* (Engel.) Br. & R. var. *tiburonensis* Lindsay, var. nov. Type plant photographed May 5, 1952, Ensenada Perro, on the southwest corner of Tiburon Island

***Ferocactus wislizenii* (Engelmann) Britton and Rose var. *tiburonensis* var. nov.**

Ab var. *wislizenii* plantis verniferis; aculeis ex totis similis, setis nullis differt.

**STEM** simple, globose to columnar, to 1 m. tall and 3.5 dm. wide. **RIBS** about 21, 3 cm. tall, slightly tuberculate. **SPINES** usually heavily annulated, not clearly differentiated into radial and central series; the 4 most central spines terete, cruciform in arrangement, straight or somewhat tortuously twisted, the lower sometimes flattened and to 9 cm. long; radial spines subulate, anulate, strongly resembling the centrals but not as heavy, though never setaceous. **FLOWERS** yellow, funnelform, 6 cm. long and 5 cm. wide; lower outer perianth segments very broad, 20 mm. long and 17 mm. wide, sub-deltoid, yellow or reddish; inner perianth segments yellow, broad lanceolate, to 40 mm. long and 11 mm. wide, margins serrulate, stamens yellow to red, 5-15 mm. long; style 30 mm. long, 4 mm. thick, yellow, furrowed, the top divided into about 20 yellow stigma lobes. **FRUIT** fleshy, yellow, when dried 2-3 cm. long and to 2.5 cm. wide, with persistent perianth included about 6 cm. long. **SEED** black, 2.5 mm. long and 1.75 mm. wide, rounded, with reticulate sculpturing but only traces of figuring inside the central depressions; hilum small,

round, and white. Differs from var. *wislizenii* in flowering in spring instead of mid- or late summer, in the color of the flower, and the character of the spines.

**Holotype:** Southeast corner of Tiburon Island, Gulf of California, Mexico, *Lindsay* 2229, April 30, 1952, deposited in Dudley Herbarium, Stanford University.

**Distribution:** Tiburon Island, Gulf of California, Mexico.

The barrel cactus on Tiburon Island is doubtless of the *Ferocactus wislizenii* complex, but a number of differences separate it from the typical form. I first saw the plants on Tiburon on April 3, 1947, when they were in sterile condition, and assumed that they were the normal form of *F. wislizenii* which occurs on the Sonoran mainland. Dr. Reid Moran and I again visited Tiburon on May 5, 1952, while with the Sefton Foundation—Stanford University Expedition to the Gulf of California. This time the barrel cacti were in full bloom, with a compact cluster of clear yellow flowers in the center of each plant. Apparently the blossoming period was well-advanced because there were few buds,

but many spent flowers with almost fully developed fruit. The typical variety doesn't blossom before mid- or late summer, and the fruit mature the following winter, remaining on the plants through spring. Also, the flowers of the typical variety in Sonora are red, and appear in a crown away from the apex of the plant, rather than in a compact central cluster. The spines of the Tiburon plant were variable, but lacked the characteristic setaceous radials and distinctly flattened, hooked lower central of var. *wislizenii*. The seeds of the var. *tiburoniensis* had reticulations similar to those of the typical variety but the secondary figuring in the depressions was not as conspicuous. The above combination

of factors indicated the Tiburon barrel cactus required varietal recognition and I am describing it as *Ferocactus wislizenii* var. *tiburoniensis*.

Dr. I. M. Johnston collected two specimens of var. *tiburoniensis* in 1921, his number 4270 from the southeast corner of the island, and 4251 from near Willard's point. Johnston no. 4270 from the type locality furnished the material for the description of the fruit and seeds, and was a particularly heavily armed plant, with coarse, tortuously twisted heavily annulated spines up to 9 cm. long. Dr. Johnson served as botanist on the California Academy of Sciences Expedition to the Gulf of California in 1921.

***Ferocactus diguetii* (Weber) Britton and Rose var. *carmenensis* var. nov.**

Ab var. *diguetii* plantis juvenilibus globosis non depressis; aculeis robustis; plantis maturis 1 m. altis differt.

Differs from *Ferocactus diguetii* var. *diguetii* in size: never over 1 m. tall and 4 dm. in diameter, usually much smaller. Juvenile plants tend to be globular rather than flattened, with somewhat heavier spines than the typical variety.

Holotype: Balandera Bay, Carmen Island, Gulf of California, Mexico, Lindsay 2204, deposited at Dudley Herbarium, Stanford Uni-

versity. Isotypes deposited at the Instituto de Biología, Mexico, and the Natural History Museum, San Diego, California.

Distribution: Carmen Island, Gulf of California, Mexico.

*Ferocactus diguetii* var. *diguetii* is the largest of the barrel cacti, and at its type locality on Santa Catalina Island, in the Gulf of California,



FIG. 156. *Ferocactus diguetii* (Weber) Br. & R. var. *carmenensis* on Carmen Island (left); *F. diguetii* var. *diguetii* on Catalina Island (right)

may be 12 feet tall. It grows on a number of the islands of the Gulf, and had been reported as occurring on Carmen Island as well.

On my first visit to Carmen Island in 1947 I was looking for the giant *Ferocactus diguetii*, but was able to find only small specimens, the largest about three feet tall and 15 inches in diameter. The habit of the juvenile plants was noticeably different. Instead of being flattened with a depressed apex they were short-cylindric, with rounded tops, and the spines were heavier and browner. The small size of the obviously mature plants on Carmen Island was particularly puzzling because a plate in Britton and Rose (1922: plate 11, facing pg. 122) showed two huge barrel cacti, captioned *Ferocactus diguetii*

and reportedly taken by Dr. Rose on Carmen Island. However, the same photograph had been used by Townsend (1919: 429) in his general account of the "Albatross" voyage, where it was captioned as having been taken at Santa Catalina Island, which is undoubtedly correct.

I suspected that the Carmen Island barrel cacti deserved varietal recognition at the time of my first visit, in spite of the similarity of spines and flowers to those of the typical population. Dr. Reid Moran and I had opportunity to examine the Carmen Island plants in 1952, just after studying them on Santa Catalina and Cerralbo Islands. I am convinced that the uniformly small size and different habit of the ferocacti on Carmen Island indicate they are a distinct variety.

***Ferocactus echidne* (De Candolle) Britton and Rose var. *victoriensis* (Rose) Lindsay comb. nov.**

*Echinocactus victoriensis* Rose, Contr. U. S. Nat. Herb. 12: 291. 1909.

A. P. De Candolle described *Echinocactus echidne* in 1834, from plants obtained from Thomas Coulter. The original description is complete except for fruit and seed, and is accompanied by an excellent illustration by Heyland. This is fortunate, because the species is variable and has often been confused with other similar taxa. De Candolle had first considered *E. echidne* to be a variety of his *E. bistris*, but after the plants flowered in Geneva he decided it was a distinct species. A living specimen of *Ferocactus echidne*, Bravo 34/22, in Dr. Bravo's study collection at the Instituto de Biología in Mexico, agrees with the original description and illustration of this species in all details.

Dr. Edward Palmer collected *Ferocactus echidne* var. *victoriensis* near Ciudad Victoria, on the east side of Mexico, in 1907. Living material was sent to Dr. Rose in Washington, from which he described *Echinocactus victoriensis* in 1909. When Britton and Rose established the genus *Ferocactus* in 1922 they thought *E. victoriensis* was the same as *Ferocactus echidne*, and for that reason didn't combine it in the new genus.

Dr. Helia Bravo H. studied the cacti of southwestern Tamaulipas in 1952 and reported (Bravo 1953: 538) a species of *Ferocactus* in Cuchilla Verde Canyon, near Ciudad Victoria, which appeared to partially fit the incomplete description of *Echinocactus rafaelsenis* Purpus. Dr. Ira L. Wiggins and I collected the same species on April 6, 1955, and I also assigned it to *Ferocactus rafaelsenis*. However, a comparison of our material with the type specimen of *Ferocactus victoriensis* has convinced me they are in the same taxon.

The original description of *Echinocactus victoriensis* states "Plants never cespitose . . . spines all bright yellow", which does not agree with the plants which we collected, but possibly can be attributed to the small sample available to Rose in Washington. Our specimens and the type specimen of *E. victoriensis* do match. However, our specimens have a different ap-

pearance than *Ferocactus echidne*, to which *Echinocactus victoriensis* had been assigned. I have compared the material of *E. victoriensis* with what I feel is typical material of *Ferocactus echidne* and am convinced that they belong to the same complex, but that there are sufficient differences for the separation of *E. victoriensis* as a variety.

*Ferocactus echidne* var. *victoriensis* differs from var. *echidne* in having more columnar stems which are usually more cespitose; longer, more brittle spines; slightly larger seeds; floriferous areoles which are oblong but not truncate; acute ciliate scales on the fruit rather than nearly entire scales with rounded apices; and the intangible character of a different appearance.

My collections of *Ferocactus echidne* var. *victoriensis* were made at 1,650 feet elevation in the hills 11 km. southwest of Ciudad Victoria, on the road to Jaumave. There it grew on limestone cliffs and boulders, usually in partial shade of *Ptelea trifoliata*, and associated with beautiful specimens of the cycad, *Dioon edule*. See figure 159, page 172.

*Ferocactus rafaelsenis* (J. A. Purpus) Britton and Rose, in Borg, Cacti 236, 1937, is known only from the original description. The type locality is Minas de San Rafael, San Luis Potosi, Mexico. It is described and illustrated as being a very cespitose plant with globose stems. I have been unable to locate the type locality, although there is a town of San Rafael about 30 km. north of San Luis Potosi, San Luis Potosi. Mr. Fritz Schwarz, who knows the Mexican cactus regions well, is not familiar with the type locality or the species. If *F. rafaelsenis* is the same as the plants from the Victoria-Jaumave area it will fall into the synonymy of *Echinocactus echidne* var. *victoriensis*, because it was originally described in 1912, three years after *Echinocactus victoriensis*. The description and illustration in the original publication of *E. rafaelsenis* appear to represent a different species.

***Ferocactus acanthodes* (Lemaire) Britton and Rose var. *tortulospinus* (Gates) Lindsay, comb. nov.**

*Ferocactus tortulospinus* Gates, Cact. and Succ. Journal. 4: 343. 1933.

*Ferocactus acanthodes* var. *tortulospinus* is the southernmost representative of the *F. acanthodes* complex. It is a short, broad form from the arid interior of north central Lower California, with long grayish red spines, the lower central of which is twisted and

sometimes 13 cm. long. The plant was first collected by Mr. Howard E. Gates in July, 1932, and he described it as *Ferocactus tortulospinus* in 1933. Flowers and fruit were unknown at that time, and the consistent characters of spine color and squat habit seemed



to separate it from *F. acanthodes*, although Mr. Gates indicated that the two were closely related. Marshall and Bock (1941: 149) stated that *tortulospinus* was a form of *F. acanthodes*. On April 23, 1946, Dr. Reid Moran and I found *tortulospinus* in blossom, and the flowers and fruits were indistinguishable from those of *F. acanthodes*.

I feel that the unusual habit, consistent color and type of armament, and disjunct range of *tortulospinus*

are sufficient to maintain it as a separate variety of *F. acanthodes*. It is recognizably different from the other populations of *F. acanthodes* although a close interrelationship is obvious. According to Mr. Wm. Taylor Marshall plants very similar to *F. acanthodes* var. *tortulospinus* also occur in Arizona, south of Needles, and in the mountain range behind the headquarters building in Pipe Organ National Monument.

***Ferocactus acanthodes* (Lemaire) Britton and Rose var. *lecontei* (Engelmann) Lindsay, comb. nov.**

*Echinocactus lecontei* Engelmann, Proc. Amer. Acad. 3: 274. 1856.

*Echinocactus wislizeni lecontei* Engelmann, in Rothrock, Rep. U. S. Geogr. Surv. 6: 128. 1878.

*Ferocactus lecontei* (Engelmann) Britton and Rose, Cactaceae 3: 129. 1922.

*Ferocactus acanthodes* var. *lecontei* differs from var. *acanthodes* in having more appressed spines, a more clavate body, and smaller seeds. The spines are not as twisted, and the upper and lower of the principal central spines are usually wider and recurved against the body of the plant. None of the characters which separate the two varieties is absolutely constant. Variety *lecontei* occupies the northern and eastern portions of the range of *F. acanthodes*. It is the common barrel cactus of eastern Riverside and San Bernardino Counties of California, southern Nevada, and all of Arizona except the northeastern section. It often is found at higher altitudes in the northern portion of its range, particularly in the Mojave desert in California and the Charleston Mountain region of Nevada. It is common along the Colorado river and its major Arizona tributaries.

*Ferocactus lecontei* has been treated as a full synonym of *F. acanthodes* in recent treatments by Marshall (1941: 148; 1950: 79) and by Benson (1944: 261; 1950: 94). Peebles has retained *lecontei* as a distinct

species, but has stated (Kearney and Peebles, 1941: 601) "This species appears to intergrade with, or simulate, *E. acanthodes*," and again (Kearney and Peebles, 1951: 674) "*Ferocactus lecontei* should perhaps be treated as a variety of *F. acanthodes*, but there are several points of difference in the spine characters."

I feel that there are sufficient differences between *Ferocactus acanthodes* and *lecontei* to justify the retention of the latter taxon as a variety. However, in the polymorphic complex which *F. acanthodes* represents it is indeed difficult or probably impossible to draw a distinct line between var. *acanthodes* and var. *lecontei*. The divergent characters which appear to be constant in some populations blend in others. On the other hand, until recently *Ferocactus lecontei* was considered to be a distinct species, and the differences are still there. I think that to include *lecontei* as a full synonym of *acanthodes* is to deny differences which are observable, and that the status of a variety within the *acanthodes* complex best reflects the relationships which exist.

***Ferocactus gracilis* Gates var. *coloratus* (Gates) Lindsay, comb. nov.**

*Ferocactus coloratus* Gates, Cact. and Succ. Journ. 4: 344. 1933.

*Ferocactus gracilis* var. *gracilis* and var. *coloratus* are two particularly attractive Lower Californian taxa discovered and described by Mr. Howard E. Gates. Variety *gracilis* is a bright red-spined plant which is usually less than one foot in diameter but sometimes up to nine feet tall, although about half that height would be nearer the average. The flowers are orange or red, the color coming from red midstripes on yellow perianth segments. Fruits are yellow. Variety *gracilis* is found in a very arid region in Baja California, between the southern end of the Sierra San Pedro Martir and the northern edge of the Vizcaino desert. The traveler going south down the peninsula will encounter them first just inland from Rosario, and will find them to below Punta Prieta. The typical variety seems to have very broad edaphic tolerance, from silt flats near the sea to alluvial gravel slopes or rocky mountains. They are found in great abundance in the clay hills about twenty miles inland from Rosario, and also nearly to the top of 4,000 foot San Juan de Dios

Peak.

Variety *coloratus* is a comparatively small population near the southern edge of the distribution of the species. It is very close to the typical variety, but is much shorter, never over three feet tall. The spines of the two varieties are identical in plan, but the upper and lower of the four principal central spines of *coloratus* are from 6 mm. to over 1 cm. wide, and not inclined to twist, as are the narrower ones of var. *gracilis*.

The population of barrel cacti in which var. *coloratus* occurs is variable, and the specimens which have been collected to represent *coloratus* are usually the extreme examples. It is possible that the population represents a hybrid swarm containing genetic material from *Ferocactus gracilis* var. *gracilis*, *F. peninsulæ* var. *peninsulæ*, which occurs in the adjacent Sierra San Borjas, and *F. peninsulæ* var. *viscainensis*, which grows in the northern Vizcaino Desert just to the south.

***Ferocactus peninsulæ* (Engelmann ex Weber) Britton and Rose var. *viscainensis* (Gates) Lindsay, comb. nov.**

*Ferocactus viscainensis* Gates, Cact. and Succ. Journ. 4: 324. 1933.

*Ferocactus peninsulæ* var. *viscainensis* was described as *F. viscainensis* by Mr. Howard E. Gates from plants he found at Mesquite, Baja California, in 1932. The population from which the type speci-

men was taken apparently represents a taxon rather intermediate between *Ferocactus peninsulæ* var. *peninsulæ* and *F. gracilis* var. *coloratus*. It is not confined to a small, localized colony, but is found for at least

FIG. 157. Spine cluster ( $\times \frac{2}{3}$ ) from the type specimen of *Ferocactus viscaianensis* Gates, for comparison with one from the type specimen (below,  $\times \frac{1}{3}$ ) of *Echinocactus peninsulæ* Engel.



thirty miles north and south of the type locality.

The holotype specimen of *Ferocactus viscaianensis* consists of three sections of ribs, with a number of areoles, and two dried fruit. The spines on each rib are variable, but the two best preserved areoles with spine bundles are indistinguishable from those of the holotype specimen of *Ferocactus peninsulæ*, which consists of two areoles and spines collected by William Gabb near Muleje in 1867. If one were to consider only the holotype specimen of *F. viscaianensis* he would be inclined to treat it as a synonym of *E. peninsulæ*. I do not think the holotype specimen of *F. viscaianensis* accurately represents the taxon ascribed to it, but that it is a rather wide variant. Photographs with the type sheet show three specimens from near Mesquite which appear to better represent the population there. I feel that the "viscaianensis" population is distinct from *F. peninsulæ*, although the two are obviously in the same complex, and that its relationship can best be indicated by treating it as a variety of *F. peninsulæ*.

*Ferocactus peninsulæ* var. *viscaianensis* differs from var. *peninsulæ* in having shorter, stiffer, more tubular flowers, shorter, less differentiated spines, which somewhat resemble those of *Ferocactus gracilis* var. *coloratus*, and other rather inconstant and intangible differences.

***Ferocactus townsendianus* Britton and Rose var. *santa-maria* (Britton and Rose) Lindsay, comb. nov.**

*Ferocactus santa-maria* Britton and Rose, Cactaceae 3: 131. 1922.

*Echinocactus santa-maria* Rose ex Schick, Monats. Kakteenk. 29: 13. 1919. (nomen subnudum).

*Ferocactus townsendianus* var. *santa-maria* was discovered in 1921 by Dr. Rose, when the "Albatross" expedition visited Santa Maria Bay, on Magdalena Island, Lower California. It was mentioned briefly as *Echinocactus santa-maria* Rose in a horticultural article by Schick in 1919, but there was no intent to publish, and the valid description was by Britton and Rose in 1922.

Rose found only small specimens at the one locality. Mr. Howard E. Gates and Wm. Taylor Marshall looked for plants on Magdalena Island in 1932, and I did also in 1937, but we were able to find only the typical *Ferocactus townsendianus*. The Sefton Foundation-Stanford University expedition stopped at Santa Maria Bay March 31, 1952, and I found four plants of *santa-maria* growing on the rocky headland which forms the bay. The largest was about 2.5 feet tall. Two specimens were collected, one of which was sent to the Museo de la Flora y la Fauna Nacional, Mexico, and the other is in my study collection, where it blossomed in the summer of 1953, in June 1954, and August 1955.

Britton and Rose knew only small specimens, without flowers, when they described this species, which

they based largely on the character of rather straight ascending central spines. Actually, *Ferocactus santa-maria* is very close to *F. townsendianus*, which Rose discovered on the same expedition and named at the same time. The plants have morphologically similar flowers and the same number and arrangement of spines. The flower color is yellow in *santa-maria* instead of red or orange, and the plant stem is more globular than that of *townsendianus*, which is conical. The straight, ascending central spines mentioned by Britton and Rose in their original description of *F. santa-maria* are not particularly obvious in the holotype specimen or those which I collected, and specimens of *F. townsendianus* from near Cape San Lucas with straight or barely curved central spines are not unusual.

I believe that the relationship here indicates the two taxa should be treated as varietal forms of the same species. *Ferocactus townsendianus* var. *townsendianus* has a much wider distribution, occurring on the hills and coastal plains of southern Lower California south of the 26th. parallel, while var. *santa-maria* is known only from the one restricted locality at Santa Maria Bay.



FIG. 158

*Ferocactus townsendianus* Br. & R. var. *santa-maria* (Br. & R.) Lindsay, comb. nov., at type locality (left); flowering at Stanford University (right) in August, 1955.

***Ferocactus histrix* (De Candolle) Lindsay, comb. nov.**

*Echinocactus histrix* De Candolle, Mem. Mus. Hist. Nat. Paris 17: 115. 1828.

*Echinocactus coulteri* G. Don, Gen. Gard. 3: 162. 1834.

*Echinocactus oxypterus* Zuccarini, in Pfeiffer, Enum. Cact. 57. 1837.

*Echinocactus electracanthus* Lemaire, Cact., Aliq. Nov. 24. 1838.

*Echinofossulocactus oxypterus* Lawrence, in Loudon, Gard. Mag. 17: 318. 1841.

*Echinocactus electracanthus* (Lemaire) var. *capuliger* Monville, in Labouret, Monogr. Cact. 184. 1853.

*Ferocactus melocactiformis* sensu Britton and Rose, Cactaceae 3: 138, not *Echinocactus melocactiformis* De Candolle.

Two echinocacti were among the many species described by De Candolle in 1828. The first of the two to be published was *E. melocactiformis*, which was described from a drawing, and this was followed by *E. histrix*, which was based on a plant received with a shipment of cacti from Thomas Coulter, in Mexico, in 1827. Most taxonomic treatments have considered the two names to be synonyms, and have used *E. melocactiformis* on the basis of priority. I do not feel that the taxon which *E. melocactiformis* was intended to describe can be identified with any certainty, and for that reason have combined *E. histrix* De Candolle in *Ferocactus*, and have referred to it the synonyms of *F. melocactiformis* sensu Britton and Rose. This move was made with reluctance, and I would like to review the history and circumstances of the description of *Echinocactus melocactiformis* which made it necessary.

*Echinocactus melocactiformis* was discovered by members of the Royal Botanical Expedition to New Spain which surveyed the botanical resources of Mexico between 1788 and 1801, under the direction of Dr. Martin Sesse y Lacasta. Sesse, and a Mexican physician who had joined him in the undertaking, Dr. Jose Mariano Mocino, returned to Spain in 1804.

They took with them their herbarium specimens, 1,400 colored drawings of plants made by Cerda and Echeverria, and manuscripts of proposed publications, including "Flora Mexicana" and "Plantae Novae Hispaniae."

Plans to publish the works failed and Sesse died in 1809. Mocino did scientific work and taught in Madrid, but became involved in political difficulties during the French occupation, and when the French withdrew he fled to France with his plants, manuscripts and drawings. Mocino settled in Montpellier and there became acquainted with De Candolle, who helped him work up some of his material, and to whom he turned over his drawings and manuscripts. In 1817 Mocino obtained permission to return to Spain, and requested the return of his papers from De Candolle, who hastily had the manuscripts and 1,100 of the colored drawings copied. The original drawings were lost after Mocino's death, but his manuscripts and part of his herbarium are preserved at the Botanical Garden of Madrid.

De Candolle published 274 new species based on his copies of the Mocino drawings, *Echinocactus melocactiformis* appearing in 1828. In the manuscript of "Flora Mexicana" Mocino had tentatively named the

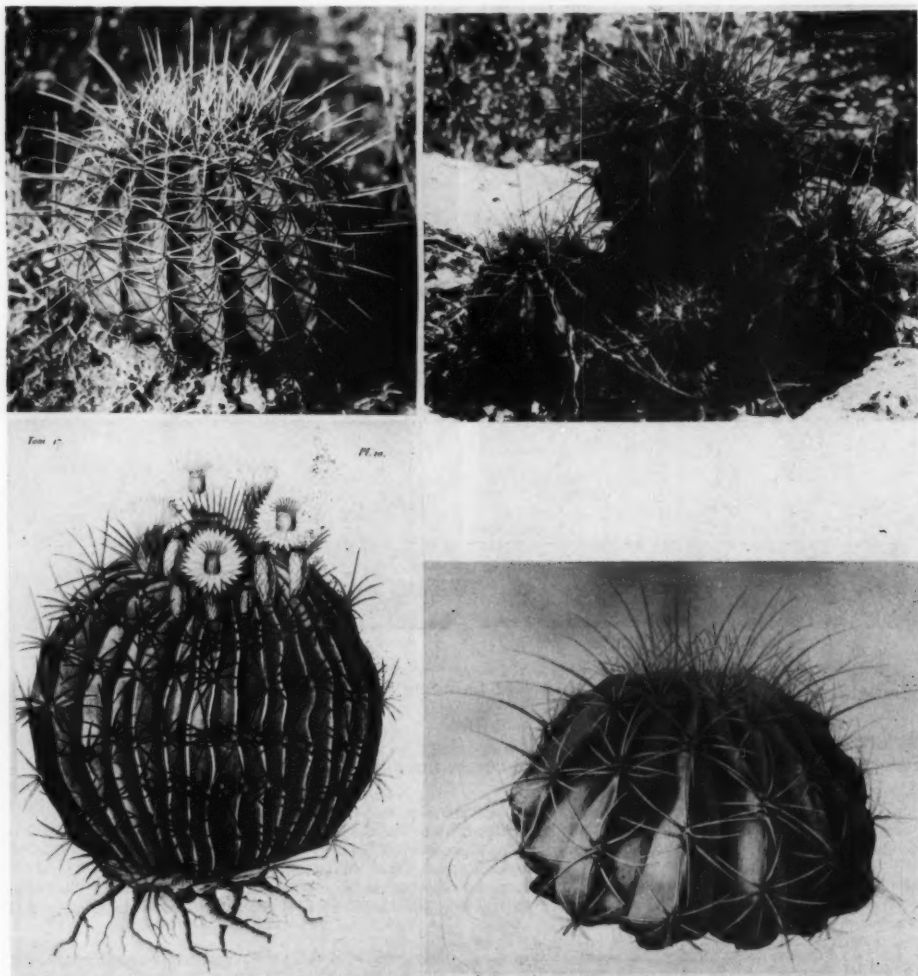


FIG. 159. (Upper left) *Ferocactus bistris* (De Candolle) Lindsay, comb. nov., from twenty-three miles west of Ojuelos, Jalisco, Mexico, which matches the neotype plate shown. (Upper right) *F. echidne* var. *victoriensis* (Rose) Lindsay, comb. nov. (Lower left) Plate with the original publication of *Echinocactus melocactiformis* which had been copied from the Mocino plate in "Icones Florae mexicanae". (Lower right) Plate on which De Candolle wrote the determination of *Echinocactus bistris*, which has been selected as the neotype of that species. Original plate is in the Herbarium Delessert, Geneva, Switzerland, and was loaned by Dr. Charles Baehni, Director of the Botanical Garden.

species *Cactus multangularis*, but De Candolle didn't use that name because of its previous use by Willdenow in 1813.

The drawing from which the description of *Echinocactus melocactiformis* was made was poor and the description was necessarily vague and inconclusive. No dimensions are given, the number of spines is lacking, and the position of the flowers is rather improbable. The flower and spine color do not fit any known species, and possibly were inexact copies from the original drawing. The plate shows a plant with the rib structure typical of an *Echinofossulocactus*.

On the other hand, *Echinocactus bistris*, which De Candolle described the same year from a plant he received from Coulter, is clearly described as to shape, ribs, and spines. The type specimen was small, and in dying condition when received by De Candolle, so the description lacks information about flowers and fruit. In any case, it is complete enough to be readily identifiable as representing the taxon which we are considering.

I think it is impossible to apply the name *Echinocactus melocactiformis*, and consider it to be a nomen dubium. The fact that De Candolle described both *E.*



*melocactiformis* and *E. bistris* the same year, and that the latter is applicable to the plants we are considering would indicate that *E. melocactiformis* is not.

Dr. Charles Baehni, Director of the Conservatoire et Jardin Botaniques in Geneva, Switzerland, very kindly went through the De Candolle herbarium which is preserved there searching for the original material from which De Candolle drew his descriptions. He found a note in the copies of "Icones Florae mexicanae" saying that the plate from which De Candolle described *E. melocactiformis* had already disappeared in 1873. On the other hand, he did find a water color plate by Heyland on which A. P. De Candolle wrote the determination of *Echinocactus bistris*. It is quite possible that this plate was made from the type specimen, which was not found. Dr. Baehni very generously loaned me the plate, which is reproduced here, and which I designate as the neotype specimen of *Echinocactus bistris*. The plate shows a plant identical in all respects with plants I collected 23 mi. west of Ojuelos, Jalisco, in 1951.

*Ferocactus bistris* is a beautiful golden-spined species which is often confused with *Echinocactus grusonii*. It is found on the hills and tablelands of central Mexico, in the states of Zacatecas, Durango, Jalisco,

Guanajuato, Hidalgo, and Puebla. In San Luis Potosi large specimens nearly one meter tall are sometimes found. The plants usually grow on rocky hills and cliffs, stopping abruptly at the base of the slope, but in some areas occasional specimens may occur on flat plains. Usually *Ferocactus bistris* grows as scattered individuals, but on the hills near Troncoso, Zacatecas, they were in very dense stands, the golden plants about 18 inches tall and as broad. There they were in flower on March 20, and ants were actively feeding on the nectareous gland spines which are produced between the spine fascicle and flowers in flowering areoles. The ants were licking the bud scales as well, indicating that the scales may also secrete nectar.

*Echinocactus bistris* is one of the visnagas used in Mexico for making candy, the pulp serving as a vehicle for sugar and flavoring. The fruit is edible, and is sold in the markets under the name of "tuna de visnaga." Mr. Fritz Schwartz told me that the plants are often eaten by deer, horses, and burros, who kick away part of the spine armament and devour the pulp.

The specific name of *bistris* is often spelled *hystrix* in the literature.



FIG. 160  
*Ferocactus recurvus* (Miller) Y. Ito, showing flowers and fruit.

### *Ferocactus recurvus* (Miller) Y. Ito, Cacti 1952 105. 1952.

*Cactus recurvus* Miller, Dict. Gard. ed. 8. 1768.

*Cactus nobilis* Linnaeus, Mantissa Plantarum 243. 1771.

*Echinocactus recurvus* sensu Link and Otto, Verh. Ver. Beford, Gartenb. 3: 426. 1828, as to citation, not as to description or figure (incorrectly labeled *Melocactus recurvus*).

*Echinocactus spiralis* Karwinsky, in Pfeiffer, Enum. Cact. 60. 1837.

*Echinocactus solenacanthus* Scheidweiler, Allg. Gartenz. 9: 50. 1841.

*Echinocactus recurvus spiralis* Schumann, Gesamth. Kakteen 348. 1898.

*Ferocactus nobilis* (Linnaeus) Britton and Rose, Cactaceae 3: 141. 1922.

*Ferocactus recurvus* was the first species of this genus to be described. It was collected in Mexico sometime before 1733, and was mentioned in Miller's Gardener's Dictionary, 7th edition, in 1759. This description became the basis for the name *Cactus recurvus* Miller in the 8th edition of the Gardener's Dictionary in 1768, which was the valid publication

of the species. Linnaeus based his *Cactus nobilis*, published on page 243 of Mantissa Plantarum, on Miller's *C. recurvus*. Britton and Rose accepted 1767 as the publication date for Mantissa Plantarum, and for that reason gave *Cactus nobilis* priority over Miller's *C. recurvus*. However, Mantissa Plantarum was published in two sections, pages 1-142 in 1767, and pages 143-

588 in 1771. *Cactus nobilis* appeared on page 243, which was published in 1771, and for that reason belongs in the synonymy under *Cactus recurvus*.

Miller, following the description of *Cactus recurvus*, made these interesting comments about that species.

The third sort was brought into England by the late Dr. William Houston, who procured the plants from Mexico; but as they were long in their passage, and had received wet, they were decayed before they arrived in England; but from the remains of them which were left, they appeared to be the most singular of all the species yet known. This had two orders of thorns; one which was straight, and set on at the joints in clusters, spreading out from the center each way like a star; and in the middle of each cluster is produced one broad flat thorn near two inches in length, which stands erect, and is recurved at the point, and is brownish red colour. These thorns are, by the inhabitants of Mexico, set in gold and

silver, and made use of for picking their teeth, and the plant is by them called Visnaga, i.e. toothpick.

*Ferocactus recurvus* has the southernmost range of the genus. It is common near Tehuacan, Puebla, and in the arid regions of Oaxaca. Some years ago indians brought Mr. Thomas MacDougall, who was living in Tehuantepec, specimens of a "visnaga" from the mountains in the vicinity. Mr. MacDougall told Dr. Wiggins and me about the *Ferocactus* when we visited him in Tehuantepec in 1935, but we were unable to find specimens in the field. Mr. MacDougall returned to New York and sent me negatives of excellent photographs he had taken of the original Tehuantepec specimens, which showed them to be *F. recurvus*.

Rather small specimens of *F. recurvus* which I collected near Mitla, Oaxaca, in 1937 have been growing at the Desert Botanical Garden since 1939. The plants have become enormous, procumbent things, four feet long, and produce a mass of whitish flowers every Christmas time, continuing to flower into April.



FIG. 161

*Ferocactus pilosus* (Galeotti) Werdermann. (Left) Near Soledad, San Luis Potosi, Mexico. (Right) Near Saltillo, Coahuila, Mexico; this is the form which has been called *Ferocactus pringlei*.

*Ferocactus pilosus* (Galeotti) Werdermann, in Fedde, Rep. spec. nov. Sonder-Beiheft C. Lief 18: pl. 72. 1933.

*Echinocactus pilosus* Galeotti, in Salm-Dyck, Cact. Hort. Dyck. 1849 148. 1850.

*Echinocactus pilosus* (Galeotti) var. *stainesii* Salm-Dyck, Cact. Hort. Dyck. 1849 149. 1850.

*Echinocactus pilosus* (Galeotti) var. *pringlei* Coulter, Contr. U. S. Nat. Herb. 3: 365. 1896.

*Echinocactus pringlei* Rose, Contr. U. S. Nat. Herb. 10: 127. 1906.

*Ferocactus stainesii* Britton and Rose, Cactaceae 3: 124. 1922. (*Echinocactus stainesii* incorrectly attributed to Hooker by Britton and Rose).

*Ferocactus pringlei* (Coulter) Britton and Rose, Cactaceae 3: 125. 1922.

Mr. Frederick Stains, an official of a mining company in San Luis Potosi, sent a large specimen of this plant to Kew Gardens. It was mentioned as *Echinocactus stainesii* in an unsigned article, concerning activities at Kew, which appeared in Audot's *Revue Horticole* (6: 248) in 1845. The article implied that the species had been named by Hooker. Britton and Rose (1922, 3: 124) accepted this reference as the original description for the species, and placed subsequent names in synonymy. However, no adequate description of the plant was published in *Revue Horticole* and apparently there was no intent to describe the new species in that article.

In the same year, 1845, the name *Echinocactus pilosus* Galeotti was mentioned in Salm-Dyck (1845: 21), but here again there was no description, the name simply occurring in a list. In 1850, however, Salm-Dyck (1850: 148) gave a full description of *E. pilosus* Galeotti which in the absence of earlier descriptions should be accepted as the valid publication of the species. The plant on which the description was based was juvenile, only 7 inches in diameter, possibly furnished by Galeotti, who had collected in Mexico. Salm-Dyck (1850: 149) also described a variety *stainesii* under *E. pilosus*, which differed in the distribution of its spines and bristles.

In April, 1885, Dr. C. G. Pringle collected barrel cacti in the mountains near Jimulco, Coahuila, and distributed them under the name *Echinocactus pilosus*. John M. Coulter (1896: 365) described the variety *pringlei* based on this material, which he said "differs in that radial spines are represented by 3 or 4 flexuous spines at the upper edge of pulvinus and 4 or 5 at lower edge; centrals 6 or 7; flowers 3.5 to 4 cm. long, brownish-red." J. N. Rose (1906: 127) elevated the variety to specific rank, listing the new combination "*Echinocactus pringlei*" with the cryptic statement "This species is very distinct from the true *E. pilosus*. Both are under cultivation in Washington."

Britton and Rose (1922, 3: 124) placed *stainesii* in the new genus *Ferocactus*, and listed *pilosus* as a synonym, based on their interpretation of the rules of priority. In their discussion of *Ferocactus stainesii* they noted "This species differs from the following one [*Ferocactus pringlei* (Coulter) Britton and Rose] in having more distant ribs, the areoles more widely separated, the spines duller colored, more numerous, somewhat curved, two of them decidedly flattened and hairs white. We know the plant only from description and illustration." The last sentence is strange in view of Rose's earlier statement that both species were in cultivation in Washington.

The characters on which Coulter based his variety *pringlei* and on which Britton and Rose maintained *pringlei* and *stainesii* (*pilosus*) as distinct species are all within the limits of variation found in many species of *Ferocactus*. In general the northern plants which have been called *pringlei* exhibit more white areolar bristles, but this is not constant, and as Werdermann (1933, pl. 72) points out, is possibly correlated with altitudinal factors. I have observed variation in number, shape, and color of spines, as well as the size and color of flowers in *Ferocactus pilosus* in San Luis Potosi and Coahuila, but these variations were conspicuous even in local populations and within the acceptable limits of any modern species concept. I am unable to find adequate constant characters upon which to maintain *pringlei*, even as a variety.

*Ferocactus pilosus* is a beautiful species which inhabits the high desert plateau of central northern Mexico. Usually it is found on rocky limestone hillsides, but it also occurs on alluvial slopes and even silty flats, between 4,500 and 6,500 feet elevation. The plants are always colorful and often enormous, sometimes eight feet tall with a number of branches rising from the base. The bright red spines, backed with white bristles, give the plant a striking appearance.

*Ferocactus pilosus* is common in San Luis Potosi, on highway Mexico 80 between El Huizache and Soledad. Here it grows with other cacti on hillsides covered with desert shrubs. Some of the associated plants are *Echinocactus palmeri*, *Mammillaria candida*, *Astrophytum myriostigma*, *Leuchtenbergia principis*, *Lophophora williamsii*, *Myrtillocactus geometrizans*, and species of *Opuntia*, *Agave Yucca*, *Fouquieria*, *Prosopis*, etc.

The fruit of *Ferocactus pilosus* is rather fleshy and acid, and is used much like lemons. The fruit is marketed, and the common name for the species is "visnaga de limon."

#### REFERENCES CITED

- Benson, Lyman  
1944. A revision of some Arizona Cactaceae. *Proc. Cal. Acad. Sci.* (4th. ser.) 25: 245-268.  
1950. *The Cacti of Arizona*. University of Arizona Press.  
Bravo, Helia, H. (Dr. Helia Bravo Hollis)  
1953. Cactaceae del Suroeste de Tamaulipas. *Anal. del Instituto de Biología* 23: 501-557.  
Britton, N. L., and J. N. Rose  
1919 to 1923. *The Cactaceae*. Carnegie Institution of Washington Publication No. 248, Vol. 1-4.  
Coulter, John M.  
1896. Preliminary revision of the North American species of *Echinocactus*, *Cereus*, and *Opuntia*. *Cont. U. S. Nat. Herb.* 3: 355-446.  
Kearney, Thomas M. and Robert H. Peebles  
1942. *Flowering Plants and Ferns of Arizona*. U. S. Dept. Agri. Misc. Pub. 423.  
1951. *Arizona Flora*. University of California Press.  
Marshall, Wm. Taylor  
1950. *Arizona's Cactuses*. *Des. Bot. Gard. Bull.* no. 1.  
Marshall, Wm. Taylor and Thor Methven Bock  
1941. *Cactaceae*. Abbey Garden Press, Pasadena.  
Orcutt, C. R.  
1900. *Echinocactus fordii*. *Rev. Cact.* 2: 81.  
Rose, J. N.  
1906. A new species of *Opuntia* and *Echinocactus*. *Cont. U. S. Nat. Herb.* 10: 126-127.  
Salm-Reifferscheid-Dyck, Joseph  
1845. *Cactaeae in horto Dyckensi cultae anno 1841*, etc.  
1850. *Cactaeae in horto Dyckensi cultae anno 1849*, etc.  
Walton, F. A.  
1899. Cacti we have flowered. *The Cactus Journal* (British) 2: 103.  
Townsend, Charles Haskins  
1916. Voyage of the 'Albatross' to the Gulf of California in 1911. *Bull. Amer. Mus. Nat. Hist.* 35: 399-476.

#### PHILODENDRONS

A new booklet of 16 pages has just been written on these decorative house plants by Lad Cutak. The author has included ten excellent drawings and a full page of leaf forms. Most of us have one or more philodendrons with the names missing and this valuable

booklet will help us to identify them and to learn about their culture. The last pages are devoted to a list and brief descriptions of sixty-four philodendrons being grown at the Missouri Botanical Garden where this booklet is available for 25¢. Write to 2315 Tower Grove Ave., St. Louis, Missouri.

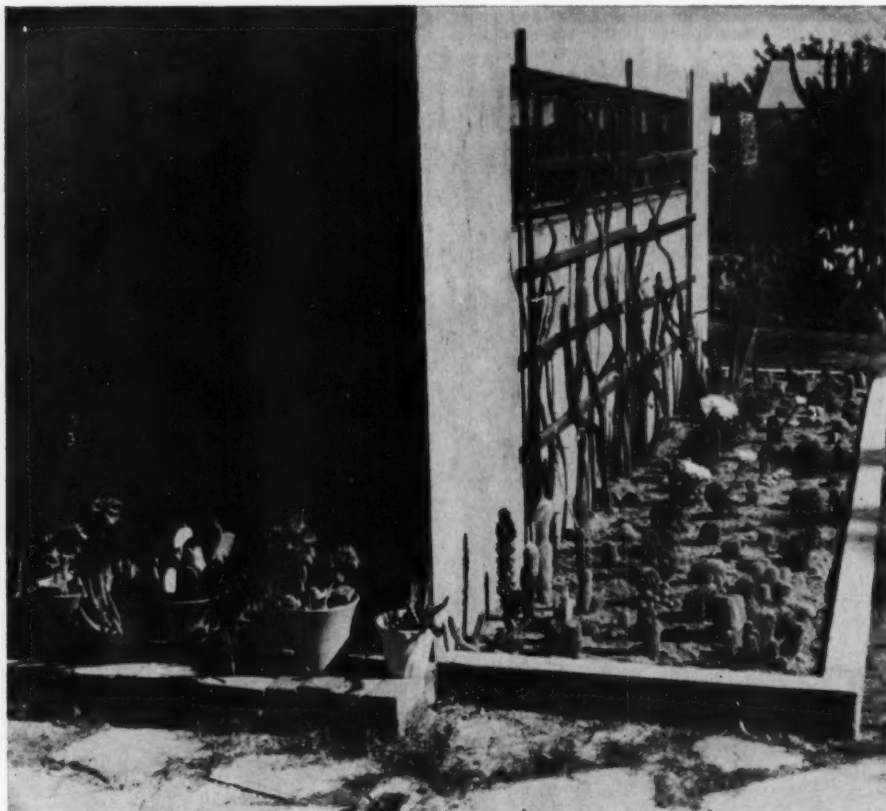


FIG. 162

The cactus bed, on the east side of a garage, is protected against the burning, afternoon sun. Yet it receives adequate light for proper growth and flowering. The potted plants, mostly non-cacti, require a different light-and-water treatment. Yet, *all* are growing in the *same* soil preparation.

## Four Hundred Cacti in One Soil

By R. C. PROCTOR

An expert cactus grower gave me two adult plants of *Coloradoa mesae-verdae*. He took great care in bringing in native soil for them and warned me that they would tolerate no other. In literature I have observed certain recommendations relative to soil mixtures that differ with a large number of species. Some experts prescribe soil formulae that vary qualitatively and quantitatively in the mineral elements they contain in accordance with a diet that each species is accustomed to in its natural habitat. The logical conclusion we may draw from all this is that each species of cacti requires in cultivation a different soil preparation from all or most of the others. What a problem this must create for the pot gardener or any

cactus collector with little space and few materials to work with.

Cacti are, indeed, fussy about their diet. Yet, I have found (to my satisfaction) that any soil containing properties which are conducive to normal growth of a given species of cactus (*except an epiphyte*) will produce proper growth for almost every kind of cactus *if all other requirements necessary for the health of the respective species are satisfied*. My wife and I have found that this is true at least in the case of the 400-odd species that we have grown in our small yard.

I sincerely hope you will derive some benefit from this discussion, but in fairness to you I must admit that I cannot speak with authority



on this subject. I am no soil chemist and certainly no expert cactologist. Mrs. Proctor and I have grown more cacti and flowered them "accidentally" than ever by deliberate, scientific intentions. The fact is we haven't the facilities or the patience to grow anything that requires critical attention to small (though important) details. That said, you may now be aware of my limitations as an expert and can read on with your guard up against a bad influence by any false notions that I may be laboring under.

From what I have observed there are two factors of influence on the growth-behavior of cacti, and they are equally as critical qualitatively and quantitatively as soil formulae. These are light and the regulation of the water supply. Apparently with respect to the various species there must be a certain, exact sort of interplay between soil and these two factors where the optimum of growth and flowering obtains. When this interplay of the three factors is correct, I find that Arizona's *Peniocereus greggii* and *Mammillaria microcarpa* will grow their best in the same soil mixture that Brazil's *Echinopsis multiplex* will grow its best. In other words while we may have to apply different light and watering methods to the various species, it does not necessarily follow that a different soil formula is required by each of them.

Indeed, we all know that the epiphytes could not endure the same conditions of light, moisture, or soil that most terrestrial cacti can be exposed to. For one thing I believe an epiphyte likes an acid soil and will not tolerate the alkali that desert cacti will. On this point I suspect *but do not know* that terrestrial cacti—most of them, at least—like a moderately alkaline soil, the absence of which might partially account for the poor showing of flowers and sometimes growth of cacti grown in gardens and pots. Your answer to this is as good as mine, but if they do like alkali, I am convinced that it must be present in the soil I use or they would not respond to the treatment they are getting. I am not concerned with what kind of soil I use. All I ask is, "Will it make the cacti grow—altogether?"

Some of us—particularly the Proctors—cannot provide the proper weather conditions, light and water, for all kinds of cacti with respect to the various species, but we certainly do not have to resort to the tedious task of preparing a separate soil mixture for each kind. All species of cacti that can take the punishment of our Arizona, summer sunshine we grow in large numbers close together in small plots to conserve space in our tiny yard. A few tender varieties are in pots in the shade, and some are in a lath-house, but all are planted in the same soil so far



FIG. 163. Morning-glory cactus—*Pseudolobivia kermansina*. This plant, grown in Switzerland, in no telling what kind of soil, has been flourishing for 3 years in company with my Arizona low-brows—on the same diet as the others. The beautiful, bluish-red flowers can hold their own among the best, for eye-appeal. They open at 1:30 a.m., and close by 8:30 p.m.—in Arizona, that is.

as we are able to determine by our none-too-accurate methods of preparing it. We do have our share of casualties, but all living things must die sometime. We attribute our losses, the percentage of which is not impressive, to exposing the wrong side of a plant to sunshine, transplanting too often, age, and, sometimes, over-watering.

Some people believe that desert cacti grow in barren wastes, but all the roots of cacti I have examined in nature were found in rich brown or black *moist* dirt either where they had reached down through interstices of sheer rock to moisture or where they intertwined and twisted through hard packed pebbles of desert floor and canyon walls. In the higher elevations where cacti are abundant even the topsoil is as black as soot with decayed vegetable matter. Moreover, various cactus species mingle together in some regions thus indicating that woodland dirt and open desert dirt contain all properties that are essential to growth of a variety of species. From these findings I long ago deduced that most cacti can be grown close

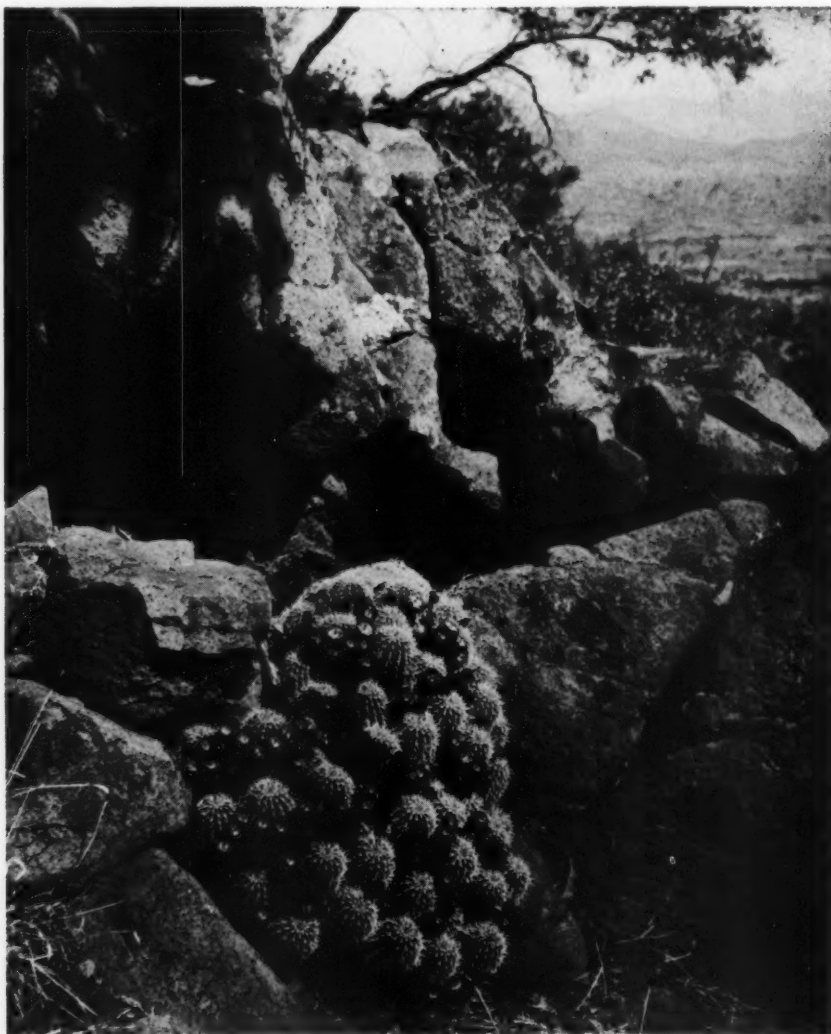


FIG. 164

Crimson hedgehog—*Echinocereus triglochidiatus* var. *melanacanthus*. A mountain plant, in Arizona, and grows in soil as black as coal—rich in decayed vegetable matter—but its kind is thriving on soil prepared for *all* my cultivated species. However it cannot resist my backyard sunshine so it is kept under lath.

together—or separately in pots—from one type of soil.

A photograph herewith shows a small cactus bed layed out along the east side of our 20-foot long garage. It contains a good number of cacti that aren't too happy about all-day exposure to our desert sunshine; yet, they won't bloom well in a lath-house or in full shade. We have no weeds to give them the proper shade that they enjoy in nature, but we discovered that they do nicely in the full sunshine of the morn-

ing and up to the time when the sun drops to the west of the garage. In our yard it is the afternoon sunshine that does most of the burning of tender hides. The cacti in this bed have been in the yard—in either one place or another—from 3 to 16 years and always in the same "Proctor-mixed" soil. Among them are a *Notocactus leninghausii*, a *Pereskopsis gatesii*, and a *Coloradoa mesae-verdae*. These make strange bedfellows.

I haven't the vaguest idea of what the chemi-

cal structure of our soil might me, but we mix one part commercially ground, deweeded, and aged steer manure with five parts of our backyard garden dirt, which is very poor in organic matter but contains neither clay nor adobe; it's the manure that does the job. To this mixture we then add an equal amount of coarse sand for free drainage. (About a quarter-inch size gravel would help if it were also mixed into the soil, but it is not too important since we are very skimpy with the water.) We do not feel that manure is the only good fertilizer for cacti; probably it is inferior to certain others. There is no doubt that rich leaf-mold or humus is the best fertilizing agent for any cactus, but here on the desert it is not economical for us to obtain either for a large number of plants. I know one cactus grower who uses chicken manure in the same manner we use steer manure and another who uses sheep manure. Neither knows "beans" about cactus culture, but you would be amazed at the beautiful results each gets with a large number of diverse species.

"What about the regulation of the water-supply for a large number of different kinds of cacti planted close together?" you may well ask. Some cacti, according to the experts, require more water than others, but we find that those that require the most will get along just as well when they receive only the amount of moisture that is compatible with those that require the least. As for our plants, we find that there is no such thing as too little water; therefore, we get along very nicely with a uniform supply to all the plants in one bed. This is determined by the requirements of those species needing the least. The real headache in watering cacti is that you can give them too much or none at all—either can be fatal.

To give you an idea of how diverse the species of a considerably large number of cacti are that can be grown in a relatively small area in one soil preparation, I submit the following list of plants contained in the bed shown in the photograph:

*Acanthocalycium violaceum*. *Acanthocereus pentagonus*. *Ancistrocactus scheeri*. *Ariocarpus retusus*. *Astrophytum asterias*, *A. capricorne*, *A. myriostigma*, *A. ornatum*. *Cephalocereus silvestrii*. *Cochemiea setispina*. *Coloradoa mesae-verdae*. *Coryphantha elephantidens*, *C. recurvata*; *C. vivipara* var. *arizonica*. *Echinocactus grusonii*, *E. horizontalis*, *E. ingens*. *Echinocereus blanckii*, *E. enneacanthus*, *E. fendleri* var. *bonkerae*, *E. pectinatus* var. *reichenbachii*, *E. pentalophus*, *E. scopulorum*, *E. triglochidiatum* var. *rosei*, *E. verdisflorus*. *Echinomastus johnsonii*. *Echinopsis aurea*, Hybrids 12, *E. multiplex*. *Eriocereus bonplandii*, *E. martinii*, *E. tortuosa*, *E. pomanensis*, *E. regelii*. *Espositoa lanata*. *Ferocactus latispinus*. *Gymnocalycium damsii*, *G. saglionis*. *Hamatocactus setispinus*. *Homalocypala texensis*. *Lemaireocereus beneckeii*, *L. dumortieri*, *L. marginatus*, *L. pruinatus*. *Leuchtenbergia principis*. *Lobivia aurea*. *Pseudolobivia kermasina* (see illustration), *L. cinnabarina*, *L. bertrichiana*, *L. pentlandii*. *Lophophora williamsii*. *Mammillaria camptotricha*, *M. candida*, *M. elegans*, *M. elongata*, *M. bidalgensis*, *M. beyderi*, *M. magnimamma*, *M. microcarpa*, *M. oliviae*, *M. parkinsonii*, *M. pseudoperbella*, *M. tetrancistra*. *Neobesseya missouriensis*. *Neolloydia conoidea*. *Notocactus leninghausii*, *N. mammosus*. *Nyctocereus serpentinus*. *Opuntia pyracantha*. *Parodia aureispina*, *P. mutabilis*. *Pediocactus simpsonii*. *Pereskiaopsis gatesii*. *Pelecyphora aselliformis*. *Sclerocactus whipplei*. *Stenocactus coptonogonus*, *S. multicostatus*. *Thelocactus bicolor*. *Trichocereus spachianus*, *Trichocereus* (variety unknown).

We are especially proud of the morning glory cactus (*Pseudolobivia kermasina*) that is also illustrated herein, because the flowers are the result of our haphazard methods of horticulture. Charlie Mieg, of Desert Botanical Garden and Cactomaniac fame—with headquarters at Tempe, Arizona—presented the plant three years ago to Mrs. Proctor. He acquired it from a friend who had grown it up to a four-inch specimen in Switzerland.

## *Echeveria flammea* Hort.?

Through the years we have received several forms under this name—but two types are most common.

In the old form of *Echeveria flammea*, one of the larger-headed "gibbifloras," the plants grow to two feet tall on a heavy stalk with, generally, a simple rosette of leaves up to twelve inches long and four inches wide, spatulate, heavily channelled, strongly mucronate, the colors a blend of yellow, bronze and purple. We sur-

mise the name derives from the flame-like streaks which develop during the fall season.

The flowering stems, rather short for the "gibbiflora" group, have numerous coral-rose flowers on short branches growing all around the stem. These flowers do not open widely, nor are they very large for this group.

The first data we find on it is a listing in a succulent catalogue of the early thirties; and Bailey's *Hortus* mentions it, but we have never



*Echeveria flammea* growing in the garden of the late Boyd L. Sloane, photographed by J. R. Brown 15 years ago when this *Echeveria* was well known

found it spoken of nor listed in European writings or catalogues.

Along in the same early thirties we received a plant from Ireland under the name of *x Echeveria devensis*, which was similar in all respects to our old *E. flammea*, except for the paler, greener color. In 1906, N. E. Brown recognized this form as *E. glauca x E. gibbiflora* ? .

Such is all the information we have been able to find on *E. flammea*, and we question whether it may not even be an older plant, possibly a species. This plant has practically passed out of cultivation, being rarely seen.

The modern form of *E. flammea* produces much smaller heads on many, spreading, semi-trailing branches growing to three feet tall and

four feet across. The leaves are up to six inches in length by three inches wide, still the same spoon-shape with a slightly grayer color. Flowers and flowering stalks are approximately the same as the old form. This plant flowers almost the year around, and with its spreading character, we consider it one of our finest pot plants. This is the plant now commonly sold as *E. metallica*—which it is not.

DON B. SKINNER

#### BOTANICAL GARDEN OPEN

The Desert Botanical Garden in Papago Park, east of Phoenix, is open for the season. Through September the garden will be open from 1 to 6 p.m. Saturdays and Sundays. Beginning Oct. 1, hours will be 10 a.m. to 5 p.m. daily except Mondays, when the garden is closed. Admission is free of charge.



## STUDIES OF SOUTH AMERICAN CACTACEAE

5. *Neoporteria taltalensis*, a new species from Prov. Antofagasta, ChileBy P. C. HUTCHISON<sup>1</sup>

*Neoporteria taltalensis* P. C. Hutchison sp. nov. *Neoporteria cauli globoso solitario usque ad 8 cm. lato cuti opace atroviridi costis tuberculatis spinis graduatis exterioribus 6-12 radialibus interioribus itidem 6-12 spinis centralibus 1-4 usque ad 4 cm. longis floribus campanulatis tubo sparse albide lanato segmentis purpureis fructo primo globoso nigro vel purpureo-nigro demum elongato purpurascente.*<sup>2</sup>

Plants usually solitary, globular or semi-globular; stem up to 8 cm. broad and 5 cm. tall, including spines 13 cm. broad and 9 cm. tall; roots fibrous or somewhat tuberous; epidermis dark dull green, in sun often tinged with purple; ribs 13, vertical, up to 1.5 cm. broad, grooves up to 1.0 cm. deep; tubercles chinned below areole; areoles subpyriform or pyriform to oval or rounded-rectangular, about 5 mm. wide and 8 mm. long, 5 mm. apart or more; areolar wool at first tan, later grey-white; spines intergrading; outer 6 to 12 radial spines at first tan or brown, later white or whitish grey, thin, often flexuous, straight, curved, or twisting, suberect, from 3 or 4 mm. to almost 2.0 cm. long, grading somewhat abruptly to 6 to 12 thicker more rigid inner radial spines, these at first dull grey-black or very dark grey-brown, somewhat glaucous except at apex, later almost totally grey except apical 5 to 10 mm. which is blackish, suberect or erect, to 3 cm. long, straight or barely curved, rarely somewhat obscurely hooked at apex, grading to slightly thicker stouter central spines or indistinguishable from 1 to 4 central spines, these usually 3.0 cm. long, rarely up to 4.0 cm. long, otherwise similar; flowers produced apically usually in top 2 or 3 areoles of a rib, one flower to an areole, these opening at different times over an interval of several weeks; flowers at first 3 cm. tall and 2.0 to 2.5 cm. broad, when perianth segments expand, 2.0 to 2.5 cm. tall and 3.0 cm. across or slightly more, campanulate, base of pericarpel to apex of perianth tube ca. 18 mm., tube scales producing white woolly hairs, near tube apex a few twisting tan bristles up to 1.0 cm. long produced; perianth segments lanceolate, to 1.5 cm. long, 2 to 3 mm. broad, entire, uniformly colored or

slightly lighter near margins, fuchsia purple<sup>3</sup>, inner segments apically hue 28/3, below shading to 28/2 and 28/1, outer segments 28/2 and darker and much darkened with intermixture of brown and green, tube scales almost black apically; stamens numerous, erect or barely leaning toward style, fuchsia purple (28/3) to whitish below, ca. 8 mm. long; anthers and pollen yellow; stamen insertion in series in middle section of perianth tube; style pure fuchsia purple (28), 1.5 to 1.7 cm. long, stout, 1.5 mm. diam. above and below grading to 1.0 mm. diam. at mid-section; stigma lobes fuchsia purple (28/1), clasping, ca. 3 mm. long, papillose, same color as style; ovary at anthesis hemispherical or approximately, funiculi unbranched, uni-ovulate; ovules galeate, roughened; nectary chamber elliptical in longitudinal section, pure fuchsia purple (28), ca. 1.5 mm. deep and 4 mm. in diam., open to an uncolored perianth tube chamber ca. 3.0 mm. diam. and 3 to 4 mm. long, this chamber furrowed by adnate stamen bases; fruit at first globose, 12 mm. diam., black or purplish black, very solid, after several months becoming elongate, then 14 mm. diam., and 24 mm. long, fading in color to purplish; perianth withering-persistent; seeds galeate, 1 mm. diam., tuberculate, sooty black.

TYPE: Chile, Prov. Antofagasta, Dept. Taltal, Sierra Esmeralda, ca. 3 miles north of Planta Esmeralda and ca. 1 mile inland from the coast on a road to the shoreline, on sides of shallow ravines, P. C. Hutchison #420, ex hort. University of California Botanical Garden #52,592-1 (UC-Holotype).

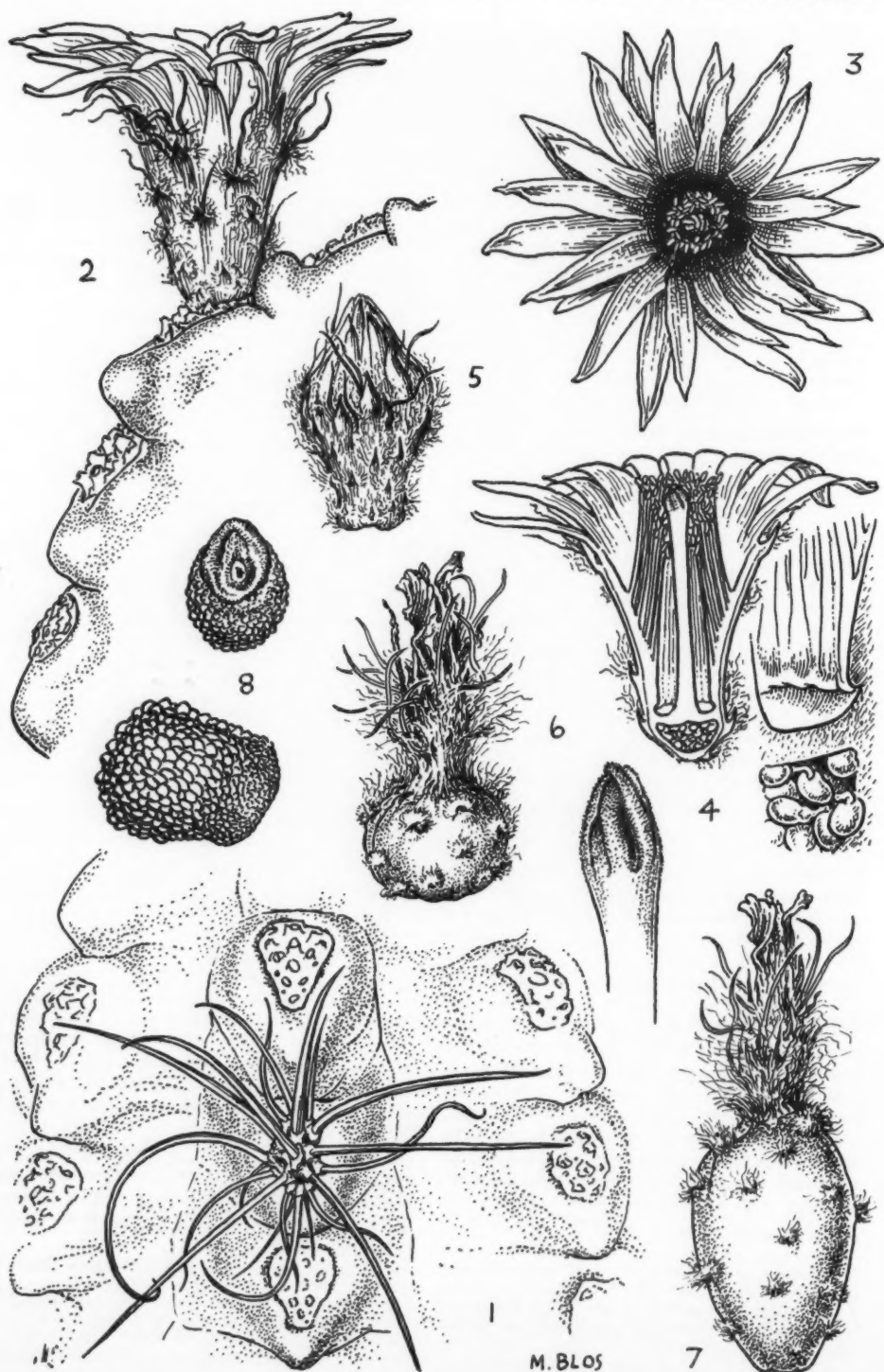
Common associates on ravine sides were *Oxalis gigantea* Barn., *Deuterocohnia chrysantha* Philippi, *Copiapoa* sp. nov. (cf. P. C. Hutchison #418A, UC), *Echinocactus pepinianus* Schumann (cf. P. C. Hutchison #418, UC)<sup>4</sup>, *Trichocereus deserticolus* (Werd.) Backeberg (cf. P. C. Hutchison #419, UC), *Eulychnia iquiquensis* (Schum.) Brit. & Rose (cf. P. C. Hutchison #421, UC). The latter species was not common at this locality but a few kilometers inland it was plentiful (cf. P. C. Hutchison #421, UC). On small flat plateaus at the top of

1. University of California Botanical Garden (Berkeley) Contribution No. 135.

2. Latin diagnosis courtesy of Dr. Rimo Bacigalupi, Curator, Jepson Herbarium, University of California.

3. Fuchsia purple and hues of it referred to are from the Horticultural Color Chart, 1938.

4. *Echinocactus pepinianus* Schumann is probably a *Copiapoa*. This species will be discussed in a forthcoming article.



## OPPOSITE PAGE:

FIG. 167. *Neoporteria taltalensis* P. C. Hutchison. 1. Frontal view areole and spines. 2. Lateral view flower and rib with spines removed. 3. Apical view flower. 4. Longitudinal section flower with details x 6 of nectary chamber, ovary and stigma lobes. 5. Lateral view bud. 6. Immature fruit. 7. Mature fruit. 8. Seed x 20. All drawings x 2 except seed and details of interior of flower. Drawing by Mrs. M. Bloss.

ravine walls *Copiapoa cinerea* (Phil.) Brit. & Rose was common (cf. P. C. Hutchison #422, UC). In this general vicinity is the type locality of *Copiapoa taltalensis* (Werd.) Looser but I found plants of that species only near Taltal.

The development of the fruit of this new species, as well as its color is quite unique among those species of *Neoporteria* known to me. For some months after fertilization the fruit develops slowly only to a diameter of 12 mm. and is black and globose. It then suddenly begins to elongate and to dilute in color towards purple or purplish-pink. At maturity it is quite similar in morphology to the fruit of many Chilean *Neoporterias*, although differing in color.

This remarkably distinct new species appears to be closely related to *Neoporteria jussieu* (Monv.) Brit. & Rose which occurs to the north at Paposo (cf. P. C. Hutchison #403, UC) and to *Neoporteria kesselringiana* (Dölz) P. C. Hutchison<sup>5</sup> which occurs to the south in Prov. Coquimbo (cf. P. C. Hutchison #346, UC). It differs from other species of *Neoporteria* (*sensu lato*) in its spination, flower and fruit, and particularly in the development of the fruit through two very distinct morphological phases.

Five plants were taken in the original collection of this species and only one has survived in cultivation; grafted on stock of *Trichocereus spachianus*, it has grown vigorously and flowered prolifically. When the stem apex of this plant was grafted, an upside-down graft of the base of the plant was made to induce formation of offsets so that the plant might be propagated and distributed. This attempt to force vegetative

offshoots was successful and the resultant plants have grown well grafted on young seedlings of *Cereus peruvianus*. They bear the same number as the parent clone from which the holotype was prepared and consequently will be referred to here and on subsequent herbarium sheets made from them as "clonotypes".<sup>6</sup>

Cultivation of imported plants of *Neoporteria taltalensis*, and of some allied *Neoporterias*, seems to be difficult if not virtually impossible. We find, however, that seedlings raised here often grow well. When grafted these plants seem to prefer a less vigorous and slower-growing stock than *Trichocereus spachianus* or *Cereus peruvianus* to retain a healthy normal appearance. This is often true of other cacti which seem to grow slowly in native habitat (i.e., *Sclerocactus*, *Copiapoa*, *Toumeyia*, *Utahia*, *Neowerdermannia*). *Cereus jusbertyi* has recently proven a good stock for such plants.

The flowering period in cultivation here, on grafted plants, is from June to November, with heaviest flowering early and late in that period of time. All attempts at selfing have failed; the species is apparently self-sterile and the single fruit which has appeared in cultivation was probably the result of cross-pollination by insects with pollen of another species.

5. *Neoporteria kesselringiana* (Dölz) P. C. Hutchison, *comb. nov.* *Horridocactus kesselringianus* Dölz, *Kakteenkunde* 1942: 5, fig., 1942.

6. Hutchison, P. C., *Lobivia westii*, a New Species from Dept. Apurimac, Peru. *Cact. & Succ. Jour. Amer.* 26 (3): 81-83, 1954. Cf. footnote on pg. 83.

## FALL CACTUS SHOW

The Fall Cactus Show of the Henry Shaw Cactus Society had an attendance of 3000. There were 452 exhibits and 56 exhibitors. The 114 classes were broken up into the following sections: Arrangement, Decorative, Specimen, Propagation, Photo and Picture, Commercial, Garden Club, and Junior.

## INSECTASIDE

I read with not little interest F. R. McQuown's article, "An Introduction to Cacti", which appeared in the Sept/Oct issue of the *Journal*. In this article, which was reprinted from the London "Times", the author lets fall the startling information that some devoted growers use whisky or gin as a pesticide. I am very grateful to Mr. McQuown and our English brethren for a very neat solution to a ticklish problem.

No longer will it be necessary for the man of the house to sidle up to the sideboard to sneak a quick one while no one is watching—now he can grasp his favorite brand boldly and stride off in the general

direction of the greenhouse and answer the little woman's disapproving glare with a jaunty "got to get rid of those nasty old bugs, you know".

Having checked over my supply of alcoholic stimulants I embarked upon a series of experiments on my own, the results of which I now place before you. For best results it is suggested that you repair to the greenhouse, well supplied with the required "pesticides" and repeat each step along with me.

For control of Red Spider the use of Vodka is indicated. Gin is best used on *Ginocalycium* and for *Martinicereus* just add a few drops of Vermouth. It's "make mine Ballantine" when dealing with *Beerzicactus* while nothing but Hague and Hague should be used with *Haageocereus*. *Ryebutias* respond most favorably to Old Overholt.

If at this point you can still say, "Echinofossulocactus zacatacensis" you just haven't been putting your heart into your work. Shay, who shtarted thish, anyway.

JOSEPH EMMA, N.Y.

## Cacti in New York City

Growing cacti in a New York apartment can be a frustrating experience. Years ago I tried it with fair success. My *Parodias*, *Gymnocalycium*, *Frailas*, and *Rebutias* sometimes bloomed. Growth and flowering was never really satisfactory, however, and I used to day dream about miles of shiny greenhouses housing thousands of blooming cacti. Came the war, and my mother's tender but inexperienced care proved a bit too much for my plants. None survived to see V. E. Day.

Now, many years later and with a tolerant wife, I'm on the cactus path again. But this time the difference is that I think I have the whole thing licked. So much so that I've decided to write of my experiments.

My New York apartment faces south, and fortunately there are only small buildings opposite so that I get the full day-long sun. I have constructed three little greenhouses in my windows. Each one has a plywood base going from inside the window to the edge of the outside sill which is as far as one can legally extend anything in a New York building. I built frames for the houses from three-quarter inch moulding grooved in the center with a buzz-saw (for the glass) and screwed tightly together. The front of the frame has a door which swings out allowing as much ventilation as I want. I used this method with two of my greenhouses, the third is a lean-to which ventilates by merely raising the window. Glass was carefully fitted into the frames and the whole thing puttied.

In this way I can get real heat in summer and overhead sun (the greenhouses go to one hundred in the sun) and I can also get cold in the

winter as they extend outside. The temperature of the greenhouses varies as much as thirty degrees from the room. I am getting good sturdy growth on my plants now and no etiolation, the bane of the city dweller. Buds have formed on my *Gymnos* and *Parodias* and *Notocactus scopae* has a few late buds.

Ed Alexander of the New York Botanical Gardens, a real Cactus and Succulent expert, was over to see us a week ago, and he thought my greenhouses have real possibilities. He is a pessimist about flowering cacti in the east, and he feels that many of the native western plants will not bloom here. He also believes that many plants such as *Lobivias*, *Rebutias*, and *Notocacti* will take a considerable degree of cold before blooming. I agree with him and think that the reason that many eastern greenhouses do not get cactus blooms is that they have many tropical plants in with the cacti and can not lower temperatures enough in the winter to cause cacti to bloom. In general, around New York, *Gymnos*, *Rebutias*, *Mamillarias*, *Notocacti*, *Astrophytums* seem to be the easiest bloomers.

I am using a soil of one part sand, one part loam, and one part humus plus lime and charcoal. Watered pots will dry out in two hours in the New York sun so pots are sunk into "vermiculum" which covers the floor of the greenhouses. I also use soil filled window boxes into which I sink clay pots and these stand on the sills in front of the greenhouses. I get about forty to sixty three- to four-inch pots in the glass houses and the boxes hold about twenty to twenty-five.

Mr. Haselton suggested that I get in touch with Dr. G. Barad of Sheepshead Bay here and I did so. I expected a wizened old botanist but

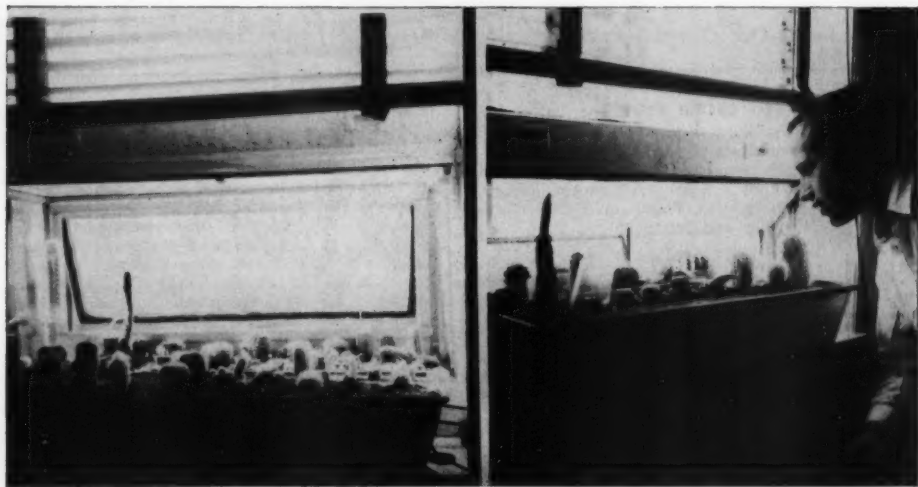


FIG. 168



got a cactus collecting obstetrician instead. Quite a guy too! Three kids, tropical fish, cats, and a very fine collection of cacti and succulents. He (lucky fellow) has a small greenhouse built over the back porch and a lean-to of glass built out from the front window. He is getting terrific results with growth and blooms, and in general my mouth watered. A *Chamaecereus* cutting

planted last year has filled a six-inch pot to cite an example.

Ed Alexander was there and we all discussed the possibilities of starting a New York Cactus Club. Perhaps those interested could get in touch with Dr. Barad or myself. New Yorkers are notorious non-joiners but the Doc, Ed and I are hopeful.

RICHARD L. RUSSELL

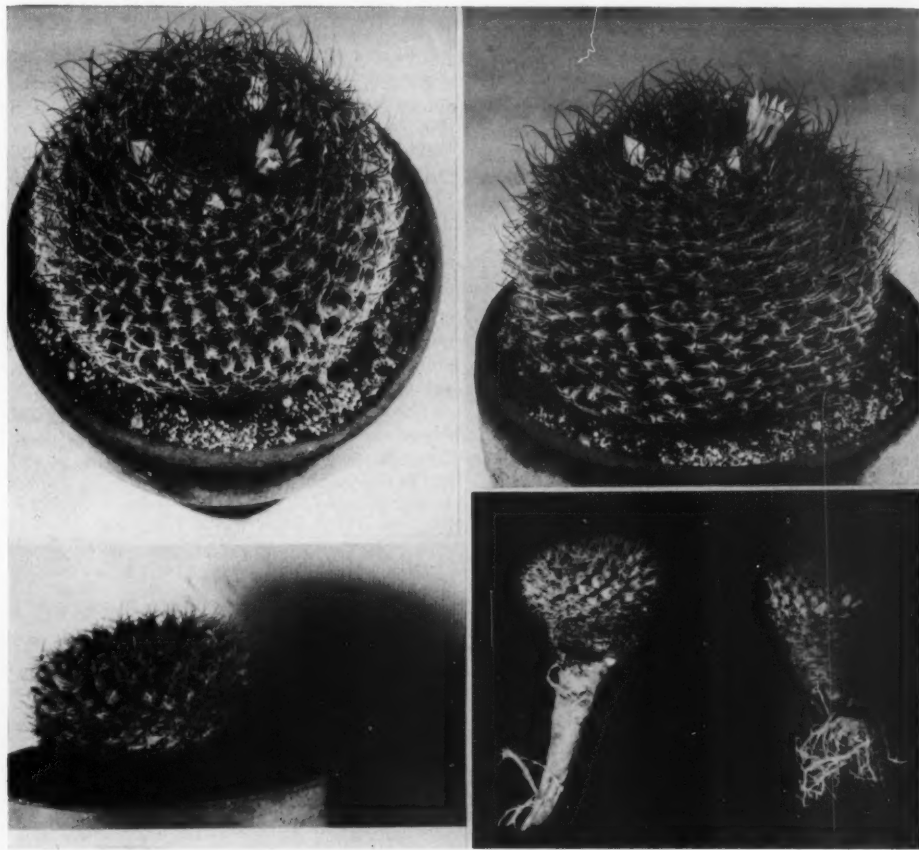


FIG. 169. *Mammillaria lewisiana* sp. nov. (Above) Photos of type specimen by George Lindsay. (Below) Plants collected by Dr. E. Yale Dawson and photographed by Dr. R. W. Poindexter.

## A New Species of *Mammillaria*

By HOWARD E. GATES

### *Mammillaria lewisiana* sp. nov.

Corpus simplex, depressus demum globosus, 7 cm. altis, 11 cm. diametro; tuberculis elongato-pyramidalis subquadrangulatis, azureo-viridio, lacteis, 8-10 mm. longis, 10-14 mm. latis, compressis dorsi-ventraliter; axillis sparse lanatis; areolis junioribus breviter tomentellis, circularibus; aculeis radialibus 10-13, acicularibus, albis, saepe extremitatibus parce fuscis; aculeis centralibus 1-3, inferioribus rectis, acicularibus,

8 mm. longis, purpureo-nigeribus, aculeis superioribus 2 cm. longis, incurvatis; floribus ex axillis tuberculorum, 2 cm. longis, 1 cm. latis; sepalis petalisque lanceolatis, viridio-flavis; baccis albis vel puniceis, clavatis, 10-15 mm. longis, 5 mm. latis; seminibus numerosis, roseo-brunneis, 0.8 mm. longis, 0.4 mm. latis, rugulosis leviter.

Roots heavy, tapering with many fibrous branches. Body simple, flattened to globular, to

7 cm. high, 11 cm. wide, apex sunken, Tubercles arranged in 13 and 21 spirals, 21 and 34 when old, flabby in texture, very numerous, flattened above and below, 8-10 mm. long, 10-14 mm. wide at base, blue green, viscid milky sap. Axils naked except for a tiny dot of very short white wool. Areoles circular, 1-2 mm. in diameter, spaced 5-10 mm. apart with very short white or slightly tan tomentum. Central spines 1 to 3, lower ones 8 mm. long, acicular, straight or flexuous, pointing down, purple black, upper central to 2 cm. long, curved upward and in, often forming complete semi-circle, purple black. Radial spines 10-13, 6-10 mm. long, acicular, light gray, brown tips. Flowers in circle 1-2 cm. from apex, numerous, one per areole, 2 cm. long, 1 cm. wide, campanulate. Tube 5 mm. long, naked, yellow tinged with green. Ovary very short. Outer perianth segments 11, 4-9 mm. long, 2-3 mm. wide, greenish yellow, faint brown mid-tripe on outer surface, tip acute, entire. Inner perianth segments 13, 1.5 cm. long, 2-3 mm. wide, greenish yellow, faint brown stripe on outer surface, lanceolate, tip acute, entire. Stamens very numerous, attached to upper margin of tube, 5-8 mm. long, arranged in circle, included 5 mm., white. Anthers linear, 1 mm. long, cream. Pistil column 1 cm. long, columnar, pale green. Stigma lobes 6-7, 2 mm. long, linear, radiating, included 4 mm., pale green. Fruits 10-15 mm. long, 5 mm. wide, clavate, smooth, naked, white to pink, skin very thin, pulp gelatinaceous, colorless, perianth remains persistent. Seeds numerous, scattered through pulp, 0.8 mm. long, 0.4 mm. wide, pyriform, light reddish brown, slightly rugulose, not dehiscent.

**Type Locality.** In light sedimentary soil in small range of granite hills, 7 miles north west of Mesquite Ranch, Northern Vizcaino Desert, Lower California, Mexico at approximately Latitude 28 30" North, Longitude 113 55" West. Elevation 400 to 500 feet. The type specimen, a collected plant that was nursery grown for several years, together with smaller nursery grown seedlings, is deposited in the Dudley Herbarium, No. 372447, Stanford University.

It is my privilege to name this plant in honor of Berkeley R. Lewis, Colonel, United States Army, who accompanied the author on a long and laborious botanical trip in Lower California.

The first record of the collection of this species is by Dr. E. Yale Dawson, in June of 1933. Dr. Dawson deposited collected specimens under another tentative name, in the Jepson Herbarium, University of California at Berkeley.

The author made collections of this plant in 1934 and on several subsequent occasions. Plants have been grown under cultivation in the Gates Lower California Botanical Garden at

Corona, Calif. for many years. The number of plants in the type locality is comparatively small and they have not been reported from any other location. Specimens are very difficult to find as the tops are usually flat, sunken to or below the surface of the soil. Under cultivation, they assume a more globular shape as is evidenced in the photograph of the type specimen made by Dr. George Lindsay. The flatter topped specimens illustrated, were freshly collected by Dr. Dawson and photographed by Dr. R. W. Poin-dexter.

Seedling plants show the flexuous incurved spines at an early age. Plants barely an inch in diameter will often blossom.

The only other *Mammillaria* with the general characteristics of *lewisiana*, that is known to grow within a hundred miles of the type locality, is *Mammillaria brandegeei* and its variety *gabbii*. This new species differs from *M. brandegeei* in that its axils are naked except for the tiny tomentose dot instead of being densely woolly in youth, principal spine is slender, flexuous and incurved instead of stiff and stright, outer perianth segments entire instead of ciliate, anthers cream instead of yellow.

The type locality is also the type locality for *Mammillaria shurliana* Gates. Other cacti prominent in this area are: *Mammillaria dioica* and *M. brandegeei*, *Ferocactus vizcainensis*, *Pachycereus pringlei*, *Lophocereus schottii* and *Le-maireocereus thurberi*. Other dominant succulent plants are *Yucca valida*, *Idria columnaris*, *Agave sebastiana* and various *Dudleya* species.

#### CACTUS AND SUCCULENT SOCIETY OF CALIFORNIA, INC.

The September meeting, which was our 20th anniversary celebration, was held at the home of Mr. Lawrence Saylor on Arguello Boulevard in San Francisco. Mr. Saylor's collection of cacti and succulents is limited to the unusual ones—not a large collection but a very interesting one, including ceropegias and stapelias. Besides his interest in cacti and succulents, Larry also has a large collection of Fuchsias. His garden was beautiful.

The October meeting was held at the home of Mr. and Mrs. Charles Genasci, 67 Slat Terrance, San Francisco on October 9th. Their garden is planted mostly with succulents and some cacti, set off by rocks collected on their many trips. Mrs. Genasci has a large collection of Haworthias; while Mr. Genasci specializes in Gymnocalyciums; all of which are on grafts. These special collections are grown in cold frames made of corrugated fiber glass. The program consisted of a slide illustrated lecture on California cacti by our National President, Mr. Homer Rush, assisted by Mrs. Rush. At this meeting our convention committee was set up and a first meeting date set for October 21, at the home of convention chairman, Paul Hutchison, in Berkeley. Although the convention is still 20 months away, we are trying to get an early start so that our first attempt at being hosts will be a successful venture.

Mr. D. Small, of San Leandro, brought four large and very beautiful Echeverias for all to see and admire. Of special interest was a beautiful specimen of Echeveria "Edna Spencer", one of Mr. Butterfield's cultivars. Forty-four members and guests were present.



### QUESTIONS and ANSWERS

Conducted by  
**HARRY JOHNSON**  
Paramount, Calif.

#### NOTES ON FRITHIA PULCHRA

A correspondent in South Africa writes of the *Mesembryanthemum*, *Frithia pulchra*,\* "You feature the variety with wine-purple flowers. There is a variety with white tinged with pink blossoms. These two color varieties grow about 150 miles apart in entirely different conditions. The wine-purple variety grows in very slight depressions of rocks on top of the Magaliesburg Mountains at an average height of 6500 feet; the white variety on top of flat rocks in very sandy soil at about 5300 feet. Both varieties withdraw till they cannot be seen during our winters when we have no rain at all—quite often for 100 days or more."

W. SEGEL

It is always interesting to learn just how the odd and curious plants found in collections really do grow.

HARRY JOHNSON

*Question:* I am considering having an iron stand made with fluorescent lights. About how far above the plants should the lights be placed? I intend to winter my plants in the cellar. While at the convention in El Paso I was speaking to you about the fog conditions under which the *Neoraimondia* and *Mila caespitosa* grew. I put my plants out in the fall fogs we have here in Philadelphia and also in the misty rains where the soil did not get moist. During the hot summer, watering did not seem to plump them up but the plants have now filled out considerably.

EDITH BUTLER, Pa.

*Answer:* Fluorescent lighting for most plants seems to be most effective when placed about 12 inches above the plants. So far as I know there is no published data of its effects on the Cactaceae or other Succulents. However, one would hazard a guess that these plants would be greatly benefited by it. Since it is not a very expensive or difficult project to set up, let us hope that enough of our members will give it a good try. Other plants can be grown in dark cellars or rooms with just the artificial light. Some of our California desert annual flowers, when grown in a dark cupboard with fluorescent lighting, flowered in less than a month from seed.

\*See color plate, Fig. 15, "Succulents For The Amateur."

The lights were used practically day and night and telescoped a whole spring's growth into a few weeks. This is somewhat analogous to what happens in the far north when the sun hardly sets. My wife, who traveled there, said one almost had to get a ladder to pick the delphiniums! I have advised others in the past to try the lighting but have never received data on the results.

*Question:* Is it advisable to repot cacti and succulents every year?

MRS. M. H. MIARS, Mich.

*Answer:* The plants are so variable and the conditions under which they are grown throughout the USA are so variable that no definite rule could be thoughtfully offered. In general, they should not be repotted every year or even every other year. Perhaps every third year would cover the greatest number quite safely. Basically, there are two reasons for repotting. Under good culture the reasons would be the exhaustion of the soil or the need for more root room. Under poor culture, the soil may be "sour." This term generally means to a gardener that the soil has suffered from an excess of water and the texture has been impaired. Where this has occurred, the soil should be washed off the roots, any dead or decaying parts cut off and the plants repotted in a suitable mixture. Care should then be exercised in watering. With almost all cacti and succulents, they should *not* be promptly watered again. I leave them unwatered in a partially shady place for from one week, for tender soft succulents, to over a month for the tougher older cacti. This will allow the roots to heal and start new root growth. One way I have found very successful for cacti two or more years old that have been mistreated, is to wash the roots clean with a nozzle, trim off the smaller roots and turn the plants upside down in a sunny place. In about three weeks the roots will be pinkish in color and often times, where cut, strong new roots will be pushing out. When repotting in damp soil, they will take hold almost at once.

To go back to the advisability of repotting occasionally: Sometimes root mealy bugs or nematode will slow a plant down to where it fails to make any growth in a season. Repotting after an inspection of the root system and determining the cause is of course necessary. If mealy bug is present, wash the roots, trim and dip in a good spray solution before repotting. Also spray the bench or window ledge thoroughly on top and underneath, or paint with crankcase discarded oil. If nematode is present, cut the roots with clippers or a sharp knife close to the base of the plant and treat as above outlined. If badly afflicted, the nematode can be com-

pletely eliminated by cutting the roots off including a thin slice of the base of the plant and drying for a month then treating as a cutting.

In regions where the water is very hard and contains various salts in solution, it will give the

plants a great lift to wash and repot every two or three years. When you use hard water, the salts build up in the soil and repotting is the only solution to the problem. Reacidifying the soil is only a partial answer in the long run.

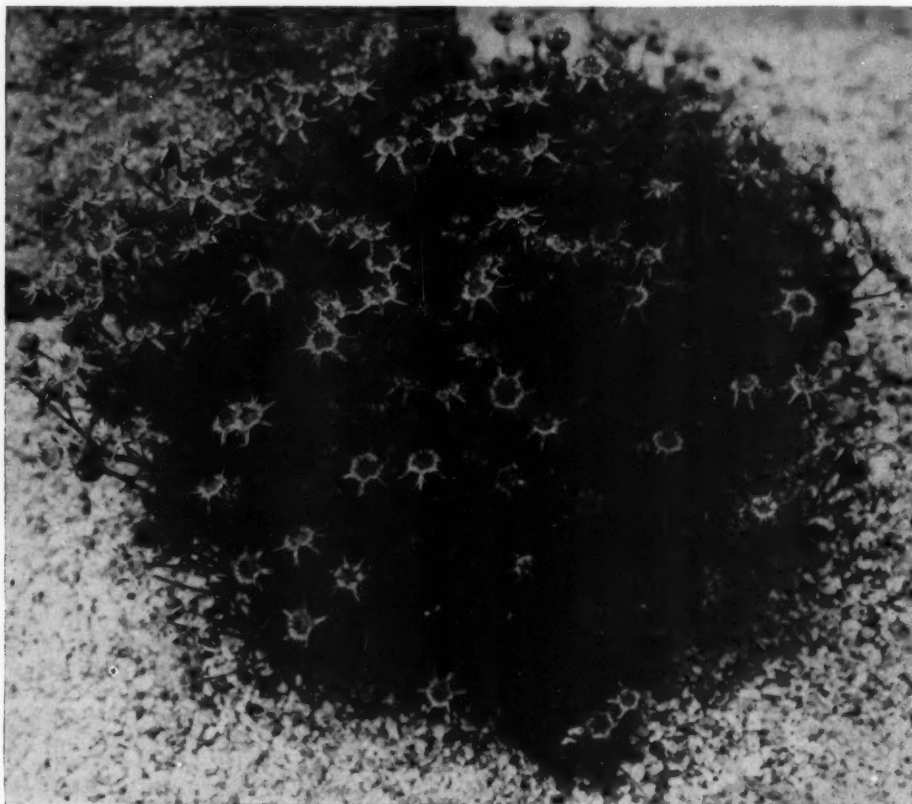


FIG. 170  
*Monanthes muralis* (Webb) Christ nat. size

## An Interesting *Monanthes*

By J. R. BROWN

*Monanthes muralis* (Webb) Christ is probably one of the best of this genus for the casual collector of succulent plants, seeming to be comparatively easy to grow and forming beautiful dwarf bushes and conspicuously attractive when in flower. It would be a fine addition to the rock garden where climate permits, as it retains a fine appearance throughout the year.

Praeger states that it has a single stem, however in cultivation here in So. California, the branches may root when in contact with the soil and eventually form a dense mass and may attain a height of 10 cm.

It is a densely branched little plant, the branches becoming bare below, with the leaves borne on the upper part of the young branches. The leafy rosettes vary in size from 1-2 cm. in diameter. The leaves are obovate or oblanceolate spatulate, sessile, 7-9 mm. long, 3-4 mm. broad and about 2 mm. thick, dark green mottled with purple, very papillose on margins, back and upper part of face. The papillae on the margins are very large and give the leaves a somewhat rough appearance. The purple markings are scarcely evident in cultivation here. It flowers over a long period in summer, May-July.

Praeger mentions that it forms clumps up to 15 cm. in diameter on the walls of houses in the town of Valverde on Hierro, but it grows into much larger clumps where conditions are favorable. It is found on the islands of Hierro

and Palma of the Canaries, growing on walls and rocks. The name *muralis* referring to its preference for walls as a growing place.

Reference: Praeger, R. Lloyd. An Account of the Sempervivum Group. 239, fig. 105, 1932.

## Notes on *Haworthias*

By J. R. BROWN

*Haworthia planifolia* var. *poellnitziana* Resende in Rep. Sp. Nov. XLVIII (1940) 113.

Plant stemless, 9-14 cm. diam., prolific from the base.

Leaves approx. obovate, very broad and abruptly acuminate or more or less rounded and apiculate; younger leaves more or less erect, the older spreading, 6-6.5 cm. long, 2-2.5 cm. broad towards the base, 3.5-4 cm. broad below the tip, green, scarcely shining, with translucent spots at the tip and towards the margins in the upper fourth of the leaf; face of younger leaves flat to lightly concave, face of older leaves with 2 shallow lengthwise grooves and somewhat convex towards the tip; back of leaves usually more or less flat and somewhat convex towards the tip, a suggestion of 1 or 2 oblique keels is shown on the younger leaves but keels absent on older leaves; margins usually very

minutely denticulate or setose.

Named in honor of Dr. K. von Poellnitz.

Type plant cultivated in the botanical garden of the Institute for General Botany, Hamburg, Germany. The plants came from South Africa without exact locality.

This variety is distinguished from *Haw. planifolia* var. *typica* Triebn. and Poelln. and its forms by the usually toothed leaf margins, from *Haw. planifolia* var. *longifolia* Triebn. and Poelln. by much broader leaves and usually toothed margins, and from *Haw. planifolia* var. *exulata* Poelln. by longer and broader leaves.

Regarding the flowers, Resende merely remarks that there is nothing unusual in comparison with the flowers of other varieties of *Haw. planifolia*, but the length of the inflorescence is noteworthy in comparison with forms hitherto described, this length never exceeded 17 cm. in all the specimens of the new variety which he saw. The word *inflorescence* above should un-

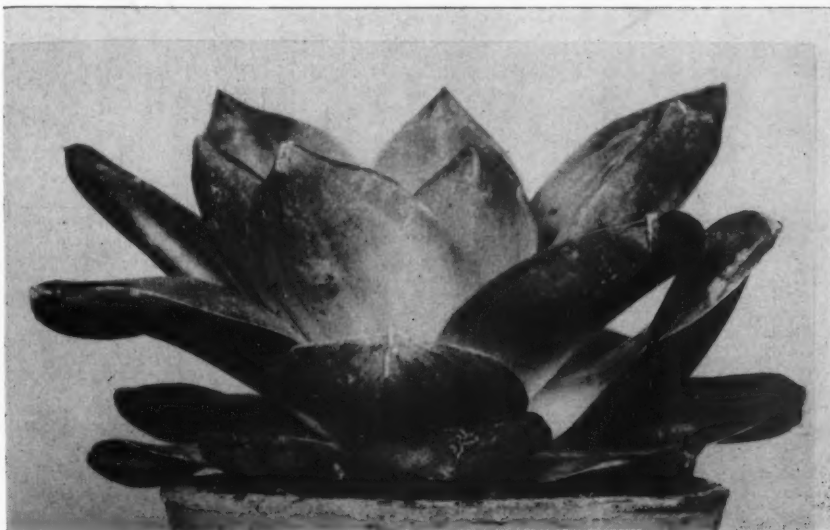


FIG. 171

*Haworthia planifolia* var. *poellnitziana* Resende  
approx. nat. size. Greenhouse grown plant



doubtedly be *raceme*, as is indicated by the measurements on the photographs of this new variety sent to me by Dr. Resende and which are as follows:

*Inflorescence* ca. 33 cm., *peduncle* ca. 14 cm., *raceme* ca. 17 cm., *number of flowers* 22, *bracts* ca. 7 mm. long, *perianth* ca. 13 mm. long.

These measurements apply to the photo of plant in flower and which is reproduced here.

The flowering stem of this plant is in 2 parts so that all of it could be shown in one photograph. This plant was grown outdoors in Hamburg, the other photo shows a plant of this variety grown in a greenhouse in Hamburg. It may be noted that the photos show a short keel on the upper part of the leaves. The photos are dated 1938. Unfortunately Dr. Resende did not bring back plants of this variety to Lisbon.

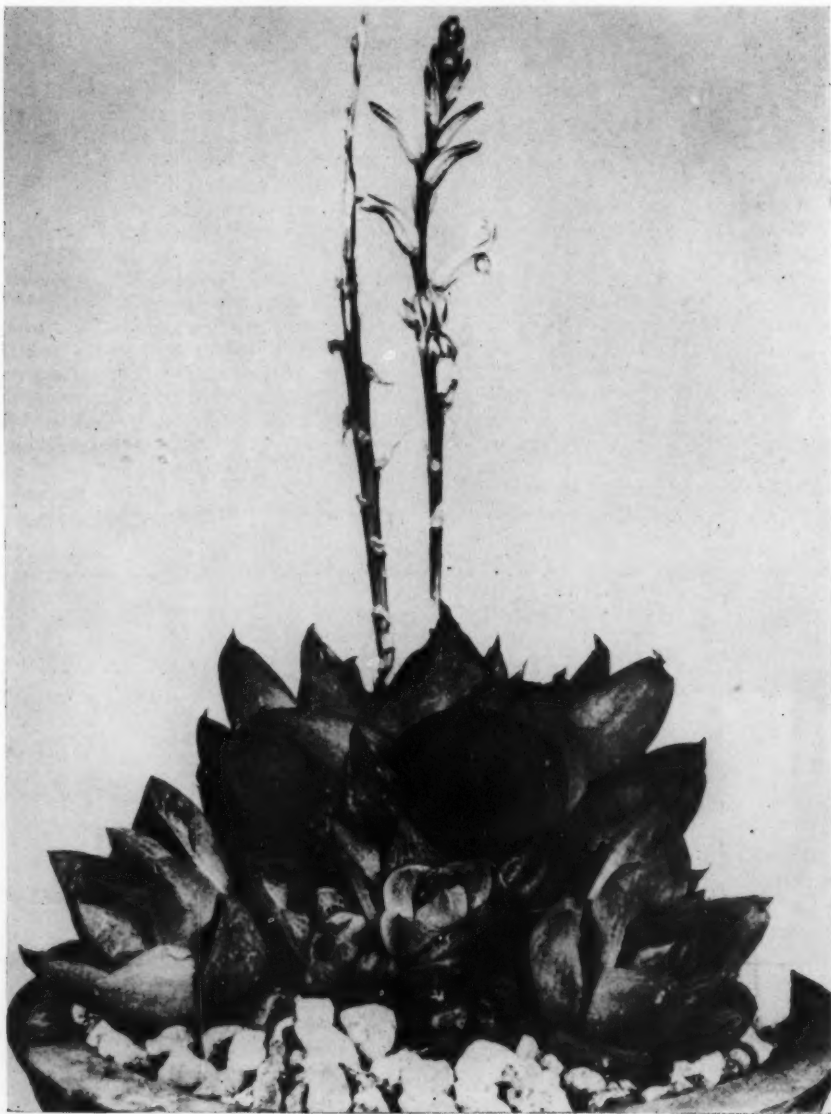


FIG. 172

*Haworthia planifolia* var. *poellnitziana* Resende  
approx. nat. size. Outdoor grown plant



# SPINE CHATS

LADISLAV CUTAK



Friends have been writing in to find out when my CACTUS GUIDE will be published. I'm as anxious to see it in print as they are but I have no control over the publisher. However, news came in today that the book is definitely scheduled for Spring and unless unforeseen difficulties arise it should be available not later than March or April.

In the meanwhile, I have written a brochure on Philodendrons which are considered to be the most decorative of all house plants today. The Garden is growing seventy different kinds in our greenhouses either as pot or specimen plants and the collection will be augmented from time to time. If anyone is interested in Philodendrons, my booklet on these plants can be secured direct from the Missouri Botanical Garden (St. Louis) for 25¢.

Sisal Wax is a by-product in the preparation of sisal fiber. Experiments were carried on at the Colonial Products Laboratory in order to compare the properties of polishes incorporating sisal (Agave) wax with similar polishes containing carnauba (Palm) wax. Three types of polishes were prepared, namely a wax polish, an emulsion polish containing solvent, and a liquid polish of the "dry bright" type. Although sisal wax will give a wax polish comparable with carnauba wax, it does not give satisfactory emulsion polishes, according to the report, because they show an undesirable property of hardening on standing. The report further states that more samples of sisal wax will have to be distributed to the polish industry in the United Kingdom in order to evaluate more extensively its commercial possibility. This interesting bit of news was gleaned from Colonial Plant and Animal Products 5 (1955) No. 1, pp. 58-61.

One of the pleasures of attending a cactus convention is that you meet interesting people. At the last one held in El Paso I had the pleasure of getting acquainted with a young chap from Albuquerque, New Mexico, who since has sent me a number of rare cacti from his State. Edward Nadolny is his name and in his veins flows the blood of Bohemian ancestors as it does in mine. He considers himself an amateur cactus collector and modestly states that he knows very little about these plants but that he finds them interesting and fascinating and therefore enjoys growing them. His interest in cacti started with one lone plant, *Echinocereus reichenbachii*, back in 1941, which flowered for him. Because he had to move about during the war years he could not seriously take up the study of cacti until he became permanently located in Albuquerque after World War II. He confided to me that Mrs. Nadolny shares his enthusiasm for his hobby and they do their "hunting" together.

I was interested in securing a few plants of the rare *Toumeyia papyracantha*, sometimes called "Paper Spine Cactus." Through his generosity a number of these plants were despatched to the Garden and were exhibited in the annual Fall Cactus Show sponsored by the Henry Shaw Cactus Society. The exhibit received a blue ribbon for the rarest and oddest plants in the Show.

*Toumeyia papyracantha* is found near Albuquerque. Although the species may be fairly abundant in distribution, Ed Nadolny found the plants scattered only

within a few square miles of his town. They grow in gramma grass at an elevation of 5,000 and 6,000 feet and are hard to spot because their papery spines are so similar in appearance to the grass. For many years, *Toumeyia* remained a scarce plant. It was first discovered in 1849 and reported only a few times after that—in 1873, in 1897, and in 1935. In recent years a concerted effort was made to relocate the cactus and learn whether it was nearing extinction. From present reports it is safe to assume that the Paper Spine is thriving in many areas and it also has been found in Arizona.

Another rare cactus which Mr. Nadolny sent me was *Mammillaria wrightii*. It first came to light in 1856, nearly a century ago, and apparently was always a rare species because very little material is included in prominent herbaria of the world today. Back in 1936 my colleague at the Garden, Paul A. Kohl, happened to be in northern New Mexico for a vacation and I asked him to collect any small cacti that he would come across. Without knowing it, he picked up 4 or 5 small cacti which turned out to be this almost extinct pincushion. They were found on the grassy slopes in the region where U. S. Highway 66 crosses Arroyo Hondo, near La Loma, about 6 miles south of Santa Fe. After a few years the plants passed away without ever flowering, so I was glad to receive this plant from Ed, which by the way, has a fruit showing. *Mammillaria wrightii* is a small plant with somewhat loosely arranged, conspicuously long, terete, flabby-textured tubercles of a dark green color. The small circular areoles produce from 12 to 14 radial spines and 1 to 3 stouter centrals, the latter often hooked at the apex.

It is said that the Joshua Tree (*Yucca brevifolia*) only branches at the point where the flower bud dies, or where an injury has been caused by the yucca foraging weevil, *Scaphophorus yuccae*. The larvae of this beetle always choose the ends of the branches in which to build their peculiar, tough cocoons of chewed-up fibrous refuse, the gathering of which injures the tree. In an attempt to wall up the injury the tree lays down silica in the cell walls and forms a sort of petrified area, then bravely branches away from it at some new angle.

A special type of paper for the Navy was made from *Yucca glauca* and *Y. elata* during World War II and the baled material brought \$40 to \$60 per ton.

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